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TENNESSEE STATE DEPT OF CONSERVATION NASHVILLE DIV 0--ETC F/G 13/13
NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE, --ETC(U)
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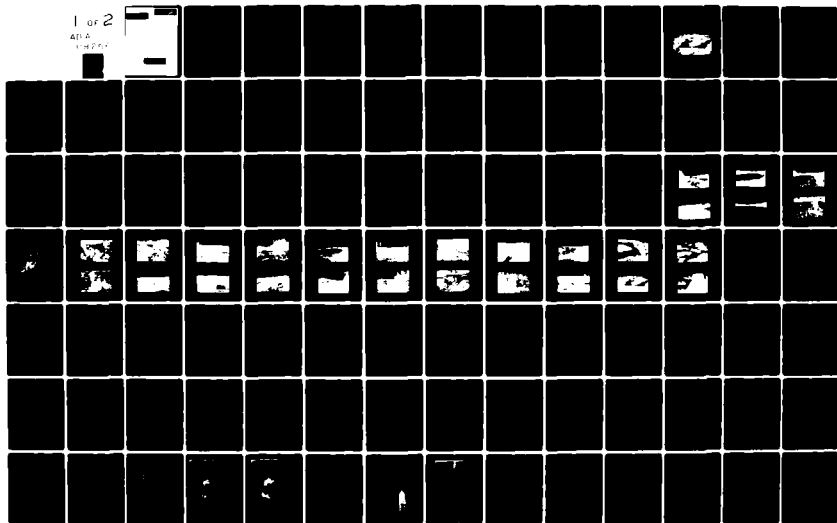
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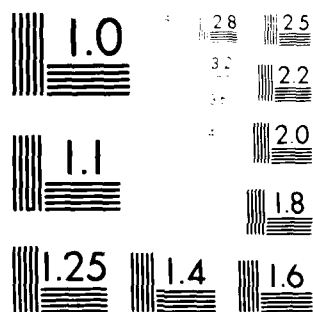
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Woodrun Dams No. 1 (west dam) and No. 2 (east dam) are colinear earthen structures 885 feet and 945 feet long respectively. The impoundments of each structure are interconnected by a channel forming a single 43 acre lake. Dam No. 1 is 27.5 feet in height with a crest width of 15 feet. Its upstream and downstream slopes are 1V:2.5H and 1V:2.8H respectively. Dam No. 2 is 33.2 feet in height with a crest width of 10 feet. Its upstream and downstream slopes are 1V:2.7H and 1V:3.6H respectively. Both dams are uniform in cross section and host no deleterious vegetation. The reservoir has a drainage area of 249		

acres. It is predominantly wood-land with an average ground slope of approximately 14%. The downstream slope of Dam No. 1 is wet with seepage beginning approximately 20 feet below the crest extending to the toe and becoming attenuated toward the ends of the dam. The seepage area is accompanied by moderate erosion near the maximum section. A property owner has dug a narrow ditch along part of the toe to channel seepage from his land. Pooled seepage exists along much of the channel and a clear flow of approximately 1/2 gpm was observed emanating from its upstream side. Seepage also exists on the downstream slope of Dam No. 2. It extends over a large area beginning approximately 200 feet right of the principal spillway, emerging from the slope 10-15 feet below the dam crest. The dam is not as wet and eroded as Dam No. 1, indicating that seepage is not as profuse. The principal spillway consists of a 30" steel pipe riser and a 30" outlet culvert of similar construction. The spillway discharges into a concrete end section and rip-rapped plunge pool, then extends downstream as a parabolic earthen channel approximately 10 feet wide and 4 feet deep. The emergency spillway is located in natural ground between the dams and extends downstream along the left abutment of Dam #2. It has a 20 foot base width with only 0.3 feet of available head at the critical section. OCE guidelines recommend that small, high hazard dams such as Woodrun pass the one-half probable maximum flood (1/2 PMF) to full PMF. Analysis reveals that the spillway is capable of passing the 1/2 PMF but will be overtopped by a maximum of 0.7 feet for 3.6 hours under the influence of the full PMF. Dam #1 was given a federal condition classification of "unsafe - nonemergency" because of the apparent uncontrolled seepage at the downstream toe. Dam #2 was given a classification of "significantly deficient" because of the large wet area on the downstream slope.

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DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

IN REPLY REFER TO

ORND-G

21 SEP 1981

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Furnished herewith is the Phase I Investigation Report on Woodrun Dams No. 1 and 2 near Rogers Springs, Tennessee. The report was prepared under the authority and provisions of PL 92-367, the National Dam Inspection Act, dated 8 August 1972.

The report presents details of the field inspection, background information, technical analyses, findings, and recommendations for improving the condition of the dams.

Based upon the inspection and subsequent evaluation, Woodrun Dam No. 1 is classified as unsafe-nonemergency due to excessive seepage through the embankment slope. Woodrun Dam No. 2 is classified as significantly deficient due to seepage through the embankment and erosion on the downstream slope.

We do not consider either dam an emergency situation at this time, but the recommendation to investigate the seepage on both dams by a qualified engineer and others contained in this report should be undertaken in the near future.

Public release of the report and initiation of public statements fall within your prerogative. However, under provisions of the Freedom of Information Act, the Corps of Engineers is required to respond fully to inquiries on information contained in the report and to make it accessible for review on request.

Your assistance in keeping me informed of any further developments will be appreciated.

Sincerely,

Kenneth W. Ashley, LTC
LEE W. TUCKER

for
Colonel, Corps of Engineers
Commander

1 Incl
As stated


CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE


Name of Dam Woodrun #1 and #2
County Hardeman
Stream Unnamed Trib. of
Thompson Creek
Date of Inspection March 10, 1981

This investigation and evaluation was prepared by the
Tennessee Department of Conservation, Division of
Water Resources.

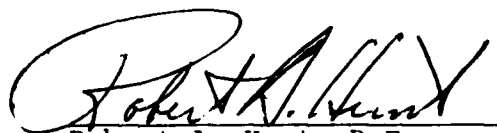
PREPARED BY:


William Culbert, Jr.
Water Resources Engineer

APPROVED BY:


Edmond O'Neill
Chief Engineer
Safe Dams Section

APPROVED BY:


Robert A. Hunt, P.E.
Director, Division of
Water Resources
Tennessee Department
of Conservation

PREFACE

This report is prepared under guidance contained in the Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I investigation. The purpose of the Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In the review of this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. Additional data or data furnished containing incorrect information could alter the findings of this report. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structures and may obscure certain conditions which might be detectable if inspected under the normal operating environment of the structure.

The analyses and recommendations included in this report are related to the hazard classification of the structure at the time of the report. Changes in conditions downstream of the dam may change the hazard classification of the structure. A change in hazard classification may in turn change the design flood on which the hydraulic and hydrologic analyses are based and may have a significant impact on the assessment of the safety of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present conditions of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspections can there be any chance that unsafe conditions will be detected.

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WOODRUN LAKE DAMS NO. 1 & 2
HARDEMAN COUNTY
MARCH 23, 1981

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE

Name of Dam Woodrun Dam No. 1 and No. 2
County Hardeman
Stream Unnamed Tributary of Thompson Creek
Date of Inspection March 10, 1981

ABSTRACT

Woodrun Dams No. 1 (west dam) and No. 2 (east dam) are colinear earthen structures 885 feet and 945 feet long respectively. The impoundments of each structure are interconnected by a channel forming a single 43 acre lake. Dam No. 1 is 27.5 feet in height with a crest width of 15 feet. Its upstream and downstream slopes are 1V:2.5H and 1V:2.8H respectively. Dam No. 2 is 28.1 feet in height with a crest width of 10 feet. Its upstream and downstream slopes are 1V:2.7H and 1V:3.0H respectively. Both dams are uniform in cross section and host no deleterious vegetation. The reservoir has a drainage area of 249 acres. It is predominantly wetland with an average ground slope of approximately 14%.

The downstream slope of Dam No. 1 is wet with seepage beginning approximately 20 feet below the crest extending to the toe and becoming attenuated toward the ends of the dam. The seepage area is accompanied by moderate erosion near the maximum section. A property owner has dug a narrow ditch along part of the toe to channel seepage from his land. Pooled seepage exists along much of the channel and a clear flow of approximately $\frac{1}{2}$ gpm was observed emanating from its upstream side.

Seepage also exists on the downstream slope of Dam No. 2. It extends over a large area beginning approximately 200 feet right of the principal spillway, emerging from the slope 10-15 feet below the dam crest. The dam is not as wet and eroded as Dam No. 1, indicating that seepage is not as profuse.

The principal spillway consists of a 30" steel pipe riser and a 30" outlet culvert of similar construction. The spillway discharges into a concrete end section and rip-rapped plunge pool, then extends downstream as a parabolic earthen channel approximately 10 feet wide and 4 feet deep.

The emergency spillway is located in natural ground between the dams and extends downstream along the left abutment of Dam #2. It has a 20 foot base width with only 0.3 feet of available head at the critical section.

OCE guidelines recommend that small, high hazard dams such as Woodrun pass the one-half probable maximum flood ($\frac{1}{2}$ PMF) to full PMF. Analysis reveals that the spillway is capable of passing the $\frac{1}{2}$ PMF but will be overtopped by a maximum of 0.7 feet for 3.6 hours under the influence of the full PMF.

Dam #1 was given a federal condition classification of "unsafe - nonemergency" because of the apparent uncontrolled seepage at the downstream toe. Dam #2 was given a classification of "significantly deficient" because of the low crest area on the downstream side.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
WOODRUN LAKE DAMS #1 AND #2
HARDEMAN COUNTY, TENNESSEE

SECTION 1 - GENERAL

- 1.1 Authority - The Phase I inspection of this dam was conducted under the authority of Tennessee Code Annotated, Section 70-2501 to 70-2530, The Safe Dams Act of 1973, and in cooperation with the U. S. Army Corps of Engineers under the authority of Public Law 92-367, The National Dam Inspection Act.
- 1.2 Purpose and Scope - The purpose of a Phase I inspection is to develop an engineering assessment of the general condition of a dam with respect to safety and stability. This is accomplished by conducting a visual inspection; reviewing any available design and construction data; and performing appropriate hydraulic, hydrologic, and other analyses. A comprehensive description of the Phase I investigation program is given in Recommended Guidelines for Safety Inspection of Dams, by the Department of the Army, Chief of Engineers, Washington, D. C. 20314.
- 1.3 Past Inspections - Woodrun Dams #1 and #2 were surveyed and photographed by State personnel on February 18, 1981, as part of a pre-inspection reconnaissance. Other cursory inspections were made during construction by the Division of Water Resources.
- 1.4 Details of Inspection - The Phase I inspection of Woodrun Lake Dams #1 and #2 was conducted on March 10, 1981. The weather was clear, sunny, and windy. The temperature was 60°F.
- 1.5 Inspection Team Members - The field inspection was conducted by the following State personnel:

Edmond O'Neill, Chief Engineer
George Moore, Regional Engineer
William H. Culbert, Jr., Water Resources Engineer

SECTION 2 - PROJECT DESCRIPTION

2.1 Location - The dams are located in Hardeman County, Tennessee, 1400 feet southeast of the Rogers Springs Community on adjacent tributaries of Thompson Creek, 4.4 miles west of Middleton. The site is shown on the Middleton U. S. Geological Survey Map (440SW) at latitude 35°02'51" and longitude 88°58'20" (location maps are provided in Appendix B of this report). Dam #1 is the westernmost dam.

2.2 History of Project - Woodrun recreational subdivision and dam was begun in 1973 and completed in 1976. A Certificate of Approval and Safety for Operation was issued by the Tennessee Department of Conservation in February of 1977.

According to correspondence on file with the Division of Water Resources, many communication problems arose between the developer and the engineer. Most issues involved a lack of supervision of critical construction features and the developer's failure to notify the engineer of his work schedule.

Design work and initial supervision was done by Smith and Associates of Memphis and later work was done by Ragon Engineering Company of Bolivar. Due to the poor communication between the engineer and the contractor, engineering certification could not be obtained on all features of the dam.

The development, including the dams, was begun by Terra Aqua, Inc. who acted as their own contractor for the major portion of the dam construction. Due to changes in ownership, construction was completed by S & W Construction Company of Memphis. The dam is presently owned by the Woodrun Landowner's Association.

2.3 Size and Hazard Classification - Based on structural heights of 27.5 feet and 33.2 feet, and a maximum storage capacity of 918 acre-feet, the dams are given a size classification of "small". A federal hazard potential classification of "high" was assigned to the site because a sudden failure of either structure could result in the deaths of

dozens of persons occupying both a trailer camp site immediately downstream and several homes and businesses 1500 feet downstream in the Rogers Springs Community. Damage would also be done to the Southern Railroad, a main line into Memphis (see photo no. 25 and the overview photo).

2.4 Description of Dam and Appurtenances

2.4.1 Geology - According to the engineering report, the area is overlain predominantly with fine silty sand to a maximum depth of 12 feet. A layer of brown sandy clay ranging from 1 to 15 feet in thickness lies beneath the surface layer. Immediately below this is a layer of gray silty clay. Due to erosion, outcroppings of both clay layers are visible.

2.4.2 Embankment - The dams are colinear earthen structures. Most of the fill material was taken from the excavation of the channel connecting the two lakes. Dam #1 is 885 feet long and 27.5 feet high with a crest width of 15 feet. The upstream and downstream slopes are 1V:2.5H and 1V:2.8H respectively. The crest elevation varies from 510.1 to 511.3 along the length of the dam. Dam #2 is 945 feet long and 33.2 feet high with a 10 foot crest width. The upstream and downstream slopes are 1V:2.7H and 1V:3.0H respectively. The crest elevation varies between 509.1 and 510.4.

According to plans and correspondence, a gravel drainage blanket and gravel toe were to be placed under Dams #1 and #2. For Dam #2, the design was modified to an SCS trench type drain. For Dam #1, the existence of a drain was never verified.

2.4.3 Service Spillway and Drawdown Facilities - According to plans, the service spillway consists of a 30 inch coated steel pressure pipe riser 25 feet tall and a 210 foot barrel of the same construction. All joints are welded. Nine 6' x 6' seepage collars surround the pipe at 20 foot centers. The drawdown is designed as a 14 inch steel pressure pipe feeding into the riser with a 36" x 36" x 24" concrete inlet box fitted with a fish screen. The drawdown is to be controlled by a 14" gate valve operated manually from the top of the riser. A 42" corrugated metal pipe trash rack

crowns the riser. The riser was to be constructed in the crest of an existing dam approximately 65' upstream of Dam #2. The spillway outlet is a 7' x 20' concrete impact basin with 2.3 feet of depth at the headwall. The impact baffle shown in the design was never installed. The end walls taper from the headwall to the end sill. At this point, the base breaks at a 1V:1.4H slope into the lower water surface.

2.4.4 Emergency Spillway - The emergency spillway is an uncontrolled earthen saddle type channel located in natural ground between the dams. It has a trapezoidal cross section with a base width of 20 feet and 0.3 feet of available head at the control section. A revised design plan (Appendix G) calls for 2.5 feet of available head with a spillway crest elevation of 507.5 feet and a dam crest elevation of 510+ feet. Its entrance and exit channels are sloped at 13% and 5.4% respectively. The exit channel runs along the left abutment of Dam #2.

- 2.5 Downstream Channel - The downstream channel is riprapped for approximately 20 feet downstream of the impact basin. It then changes into a natural earth channel with a parabolic cross-section, approximately 4 feet deep and 10 feet wide. It lies on a 2.2% slope.
- 2.6 Reservoir and Drainage Area - At normal pool elevation 502.0, the dams impound a 43 acre lake with a storage capacity of 551 acre-feet. At the top of the dam (elevation 509.1) the lake volume increases to 918 acre-feet. The drainage area for the reservoir is 249 acres. It is predominantly wooded with an average ground slope of 14%. The soil type is predominantly Lexington.

SECTION 3 - FINDINGS

3.1 Visual Inspection

3.1.1 Embankment - Both dams are reasonably uniform in cross-section and clear of undesirable vegetation. Soil tests from shallow diggings indicate a red clayey sand (SC) type material.

3.1.1.1 Dam No. 1 exhibits signs of potentially serious seepage. The phreatic line intersects the downstream slope approximately 20 feet (vertical) below the dam crest. Below this line the dam was excessively wet. Surface runoff has removed most of the grass cover from the wet area, creating a rilled appearance. A drainage ditch paralleling the toe immediately downstream of the dam contains pooled water along most of its 150 foot length. One area of measurable flow was found. Approximately $\frac{1}{2}$ gpm of clear flow emanates from the toe near the mid-section. A similar flow was observed on April 19, 1976, by Ed O'Neill (Appendix G). It is possible that this flow comes from the gravel drainage blanket, if installed.

The upstream slope of the dam has undergone some sloughing along most of its length, which is most pronounced near the midsection (see photo no. 7).

3.1.1.2 Dam No. 2 exhibits many of the same undesirable conditions as Dam No. 1. The downstream slope is wet over a large area in the mid-section of the dam beginning approximately 200 feet right of the principal spillway and 10-15 feet below the dam crest. Although the area affected is larger than that of Dam No. 1, the degree of wetness and extent of erosion did not appear as great.

Surface runoff has eroded the right abutment both upstream and downstream of the dam. A narrow gully varying in depth to 2 feet runs along the downstream tie-in. It contains pooled seepage from the wettest portion of the slope. According to Ed O'Neill, who observed the area prior to construction, this area was extremely wet prior to construction.

The upstream slope of the dam is riprapped to 3 feet above normal pool along practically its entire length. The rock contains an excessive amount of fines in many areas. It is apparently high in siltstone. Wave action and/or surface runoff has eroded the slope above the rock cover, but the condition is not as extensive as that of Dam #1.

3.1.2 Service Spillway - The service spillway is apparently in good condition. The concrete end section shows no signs of spalling, cracking, or dislocations at construction joints. The pipe outlet shows no significant signs of deterioration. The riser and valve stem appear to be in good condition, with no noticeable deterioration. The riser and valve stem appear to be in good condition, with no noticeable deterioration or structural defects (see photo no. 23).

3.1.3 Emergency Spillway - The emergency spillway is clear and uniform along its entire length. It is well grassed and shows no signs of significant erosion except near the downstream end of the exit channel. There is one large gully in this area, but it represents no danger to the embankment (see photo nos. 14-19). The distance of 2.5 feet shown on the plans between the emergency spillway crest level and the top of the dam has been decreased to 0.3', the actual dam crest being at elevation 509.1 and the spillway crest being at elevation 508.8.

3.1.4 Downstream Channel - The downstream channel hosts several small diameter trees (1" to 2"0 at the end of the riprapped section. The plunge pool then breaks on a 2 foot vertical drop and a 2% slope is established in the channel. The channel is sparsely covered with grass. It has undergone some considerable erosion but poses no hazard to the embankment (see photo nos. 22 & 23).

- 3.2 Review of Data - The data available for review includes the engineering report, complete with design drawings (Appendix E), a copy of the construction specifications, and various correspondence between the engineer and the Division of Water Resources (Appendix G) including several compaction reports. The dam was designed for a 6-hour SCS freeboard storm of 24 inches (.8 PMP).

- 3.3 Static and Seismic Stability Assessment - The actual margin of safety for static stability cannot be determined because the engineering data required for an analytical stability analysis is not available. However, an assessment of the embankment stability based on visual evidence and engineering judgment would indicate a stable structure.

The dams are in seismic zone 2 indicating only moderate damage should an earthquake occur. No seismic stability analysis is required for the Phase I investigation. Seismic stability is assumed to be adequate provided static stability conditions are satisfied and conventional safety margins exist.

- 3.4 Hydraulic and Hydrologic Analysis - According to OCE guidelines, high hazard dams of small size are required to pass the one-half probable maximum flood ($\frac{1}{2}$ PMF) to full PMF. Hydraulic analysis reveals that outflow from the PMF (AMC II) will overtop the dam by 0.7 feet for 3.6 hours. Under the $\frac{1}{2}$ PMF the dam maintains 1.9 feet of freeboard.

3.5 Conclusions and Recommendations

3.5.1 The dams are in seismic zone 2, indicating that risk of damage from seismic activity is moderate.

The extensive wet areas and the small seepage flow at the toe of Dam #1 represent a potential piping concern.

Hydraulic analysis indicates that the emergency spillway is adequate to pass the Corps of Engineers minimum design storm ($\frac{1}{2}$ PMF) for existing dams without overtopping the structures; however, the spillway will not pass the 0.8 PMP approved by the State at the time of construction.

Dam #1 was given a federal condition classification of "unsafe non-emergency" because of the apparent uncontrolled seepage at the downstream toe. Dam #2 was given a classification of "significantly deficient" because of the large wet area on the downstream slope.

3.5.2 Recommendations - The owner should:

- a. Engage the services of a qualified engineer to study the wet areas on the downstream slope of both dams and in the trench downstream of Dam #1 and make recommendations for monitoring/correction as needed.
- b. Improve the upstream slope protection.
- c. Establish a regular program of inspection and maintenance to provide detection and timely correction of problem areas.
- d. Regrade the spillway and dam crest according to plans to allow passage of the approved .8 PMP design storm.
- e. An emergency action plan should be developed, including a warning system to alert downstream residents, in the event a serious condition develops with the project.

SECTION 4 REVIEW BOARD FINDINGS

The Interagency Review Board for the National Program of Inspection of Non-Federal Dams met in Nashville on 18 June 1981 to examine the technical data contained in the Phase I investigation report on Woodron Dams Nos. 1 and 2. The review Board considered the information and recommended that (1) the condition classification for Woodrun Dam No. 1 should be changed from "significantly deficient" to "unsafe-non-emergency", and (2) the correct soil classification in Section 3.1.1 should be clayey sand. They agreed with other report conclusions and recommendations. A copy of the letter report presented by the Review Board is included in Appendix G.

APPENDIX A
DATA SUMMARY

APPENDIX A
DATA SUMMARY

A.1 Dam

A.1.1 Type - Earthfill

A.1.2 Dimensions and Elevations

- a. Crest length - Dam #1 - 885'
Dam #2 - 945'
- b. Crest width - Dam #1 - 15'
Dam #2 - 10'
- c. Height - Dam #1 - 27.5'
Dam #2 - 33.2'
- d. Crest elevation (low point) - 509.1
- e. Upstream slope - Dam #1 - 1V:2.5H
Dam #2 - 1V:2.7H
- f. Downstream slope - Dam #1 - 1V:2.8H
Dam #2 - 1V:3.6H
- g. Size classification - Both small

A.1.3 Zones, Cutoffs, Grout Curtains - Cutoff trenches were excavated for both dams. Design specifies them to be 800' long, 10' wide at the base, with 1:1 side slopes. Depths were to be determined in the field.

A.1.4 Instrumentation - None

A.2 Reservoir and Drainage Area

A.2.1 Reservoir

a. Normal pool

- 1) Elevation - 502.0
- 2) Surface area - Dam #1 - 17 acres
Dam #2 - 26 acres
- 3) Capacity - Dam #1 - 193 acre-feet
Dam #2 - 338 acre-feet
Connecting channel - 20 acre-feet
Total - 551 acre-feet
- 4) Length - Dam #1 - 1750 feet
Dam #2 - 2090 feet

b. Maximum pool (top of dam)

- 1) Elevation - 509.1
- 2) Surface area - Dam #1 - 23 acres
Dam #2 - 33 acres
- 3) Total capacity - $551 + 367 = 918$ acre-feet

A.2.2 Drainage Area

- a. Size - 249 acres (0.389 mi^2)
- b. Average ground slope - approximately 14%
- c. Soils - Lexington - 85% (B)
Falaya - 7.5% (C)
Waverly - 7.5% (D)
- d. Land use - Mostly wooded, some meadow and low density residential
- e. Runoff (AMC II)
 - 1) PMF - 26.7"
 - 2) One-half PMF - 13.4"
 - 3) 100 year flood - 3.2"

A.3 Outlet Structures

A.3.1 Service Spillway

- a. Type - Steel cylinder concrete pressure pipe
- b. Size - 30" inside diameter
- c. Pipe gradient - 2.2%
- d. Drawdown - 14" pressure pipe
- e. Capacity - approximately 115 cfs at top of dam elevation 509.1

A.3.2 Emergency Spillway

- a. Type - Open channel trapezoidal earthen saddle
- b. Crest elevation - 508.7
- c. Size - 20' base, approximately 1V:11H side slopes
- d. Maximum capacity - 11 cfs at elevation 509.1

A.4 Historical Data

A.4.1 Construction Date - 1976

A.4.2 Designer - Smith & Associates

A.4.3 Builder - S & W Construction Company of
Tennessee, Inc.

A.4.4 Owner - Woodrun Property Owners' Association

A.4.5 Previous Inspections - A pre-inspection reconnaissance survey was conducted by State personnel on February 18, 1981.

A.4.6 Operation and Maintenance - By the owner

A.5 Downstream Hazard Data

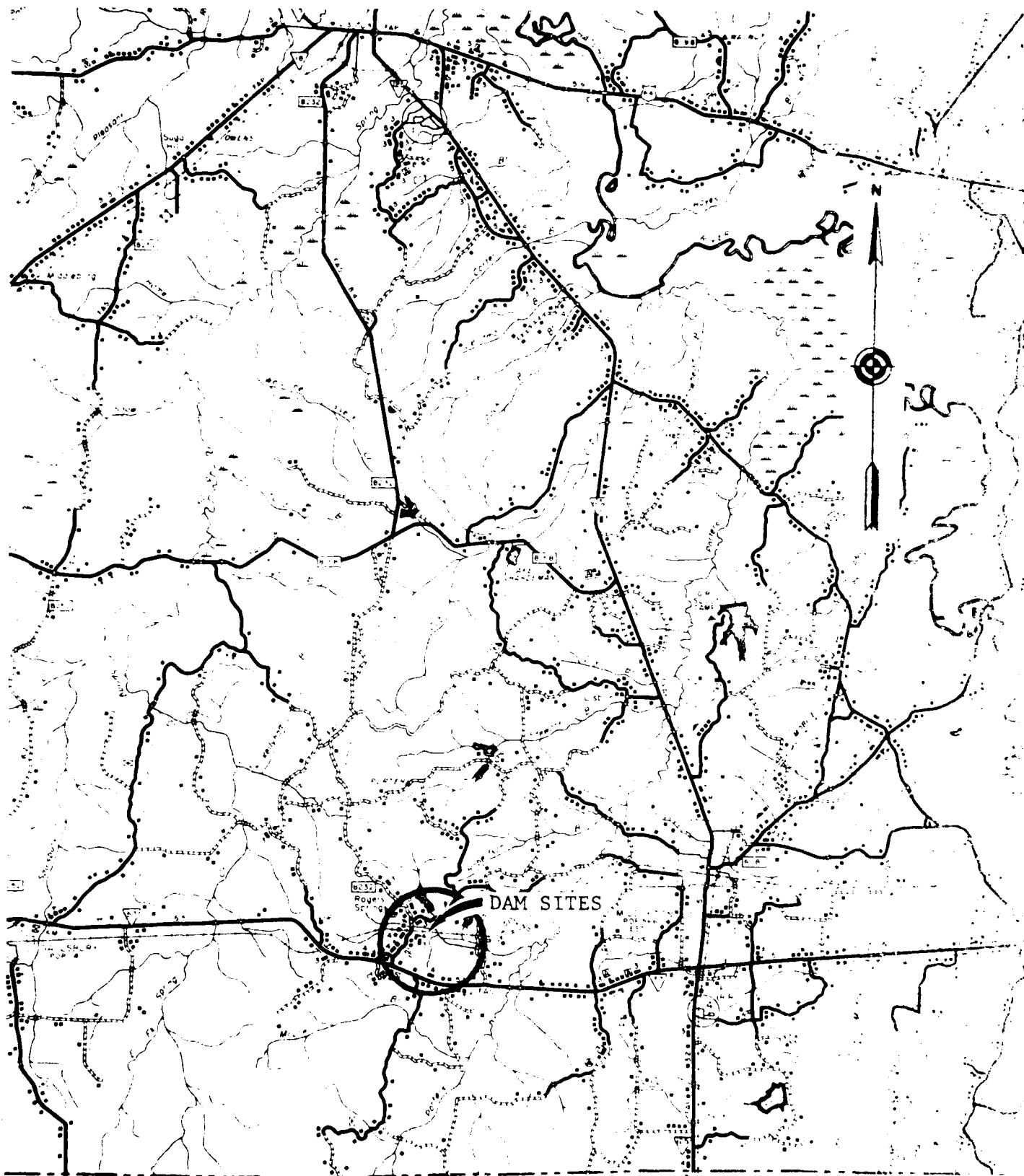
A.5.1 Downstream Hazard Classification - High

A.5.2 Persons in Likely Flood Path - Variable. Trailer camp facility immediately downstream with capacity of few dozen trailers; 7 homes and 2 stores in probable flood path at Rogers Springs Crossroads approximately 1500' downstream; 2 or 3 other homes 500' north of Rogers Springs may be affected; several dozen possible fatalities (see photo nos. 11, 25, and aerial photo).

A.5.3 Downstream Property - Campground; main rail line from Memphis; seven homes; 2 stores; one main artery; residential access road.

A.5.4 Warning Systems - None

APPENDIX B
SKETCHES AND LOCATION MAPS



COUNTY

TIPPAH

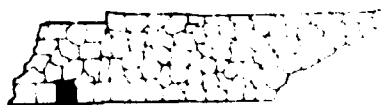
S

I

S

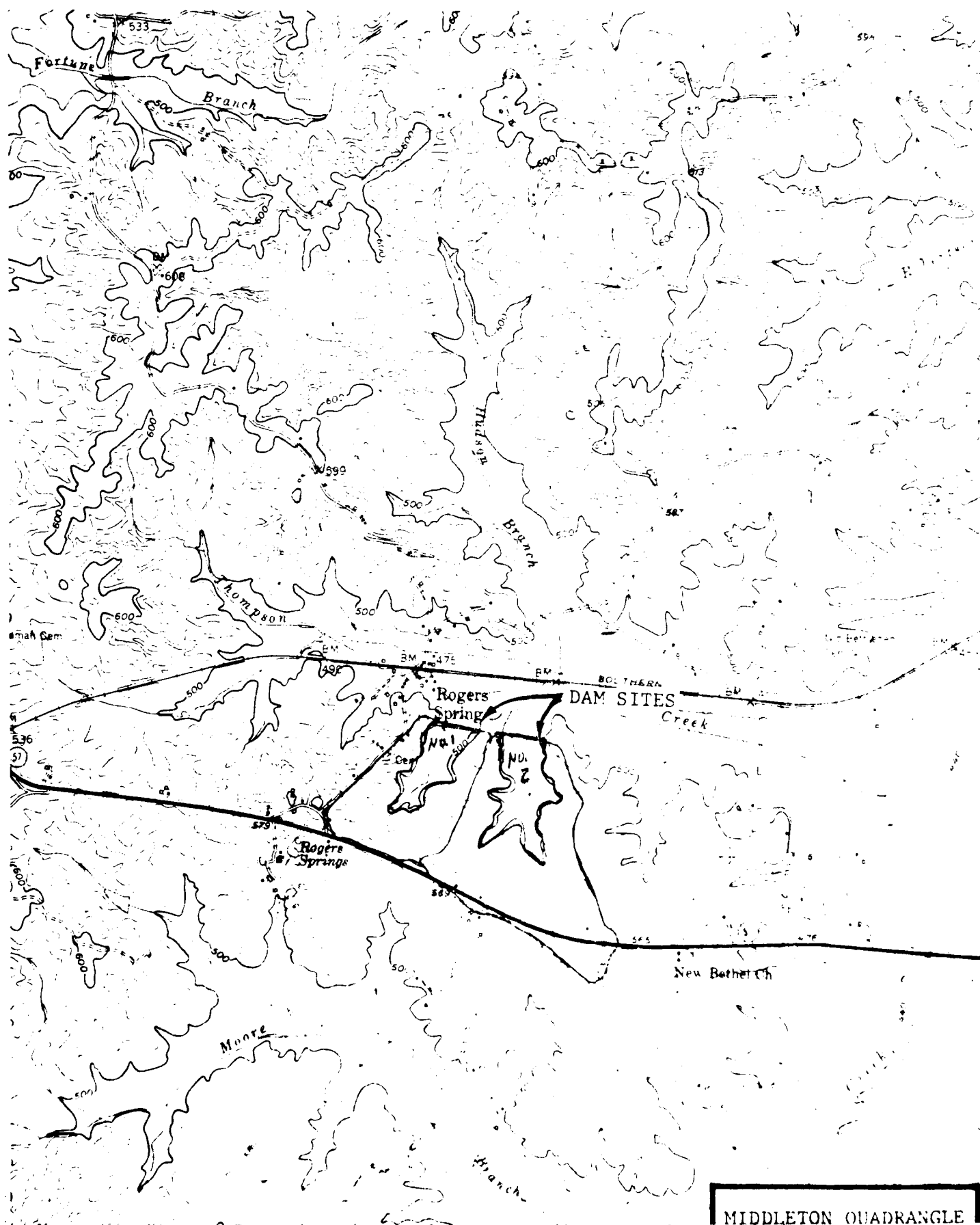
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HARDEMAN COUNTY

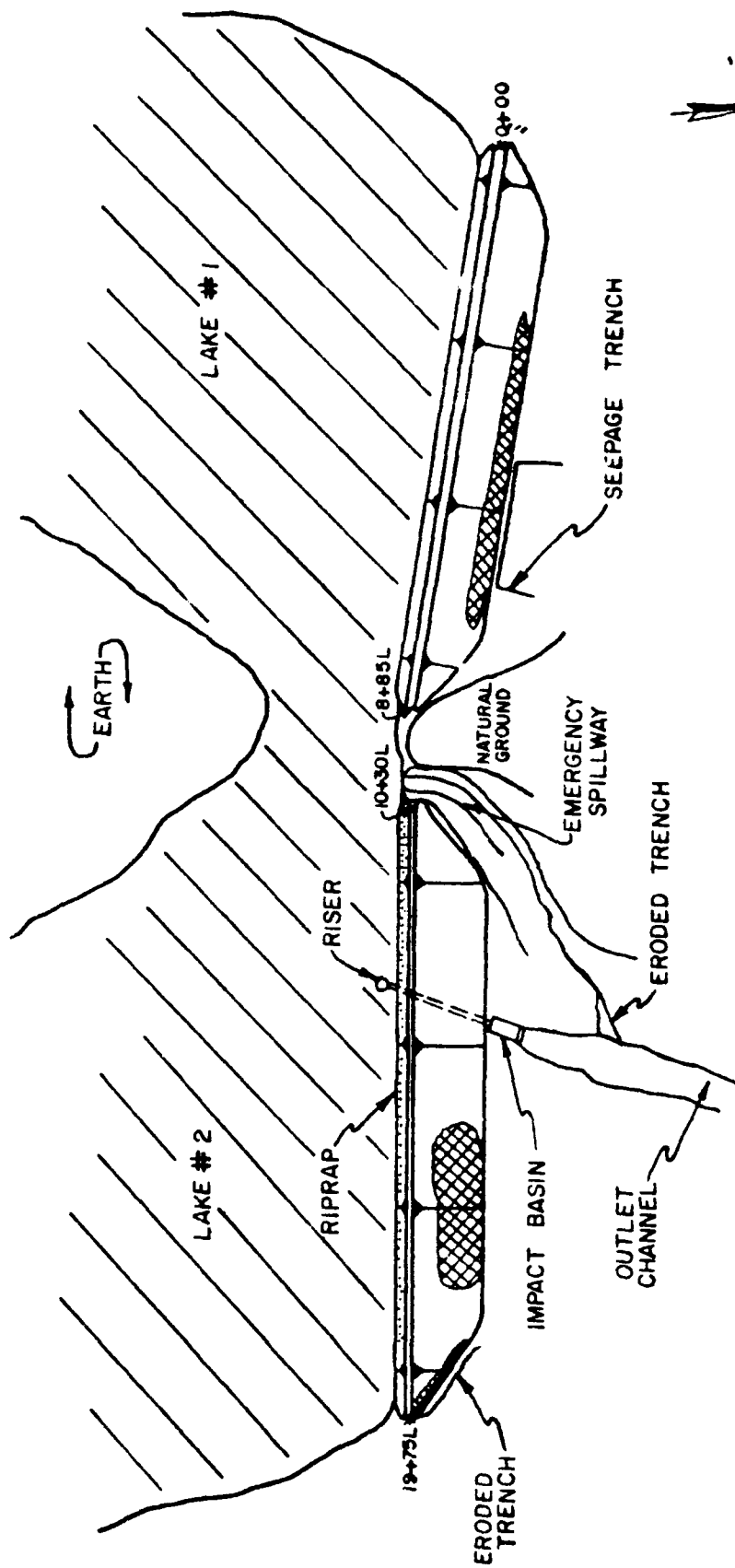


SCALE

0 1 2 3

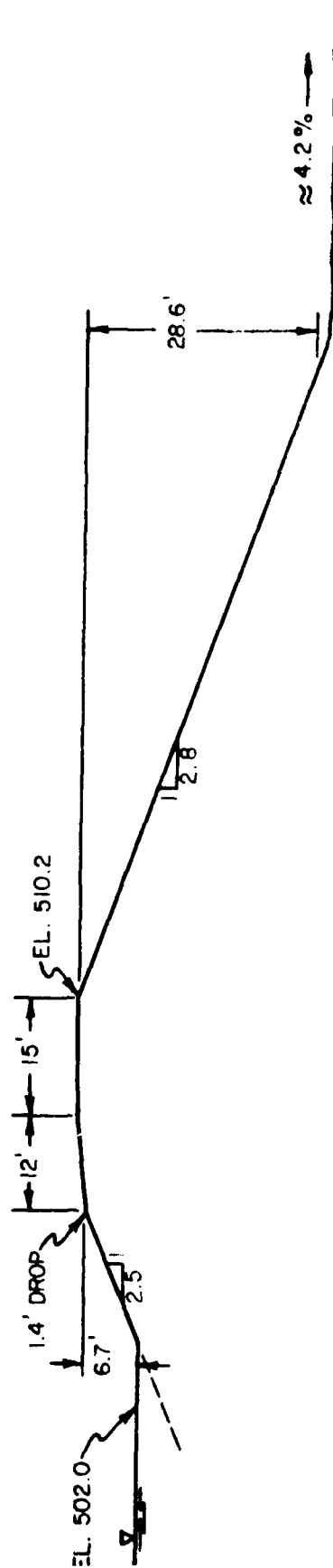


MIDDLETON QUADRANGLE



GENERAL PLAN
N.T.S.

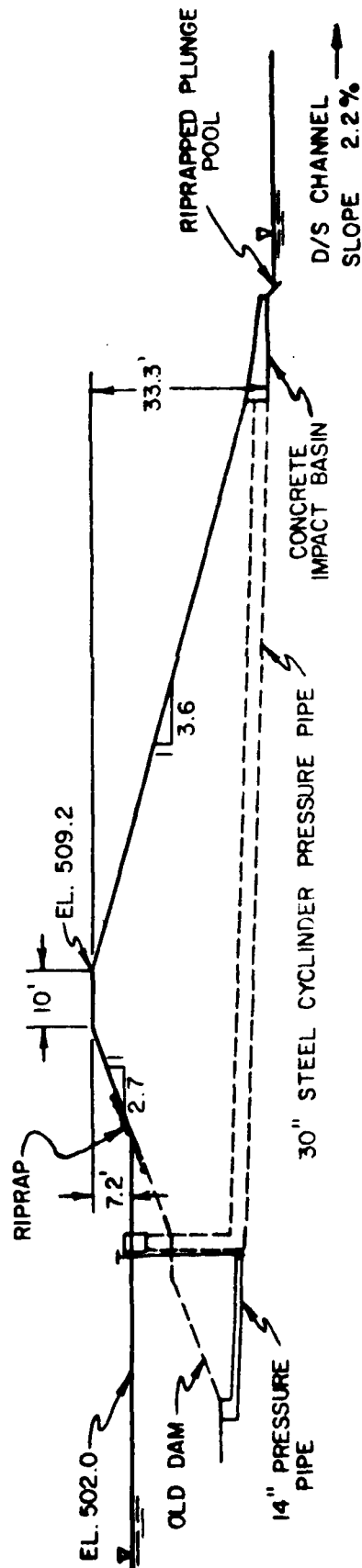
WOODRUN DAMS	
#1 & #2	
DRAWN BY	G.A.D.
DATE	5/6/51



ELEVATIONS REFERENCED TO
N.P. W.S. EL. 502.0 AS GIVEN
ON DESIGN PLANS.

MAXIMUM SECTION (#1)
SCALE: 1" = 20'

WOODRUN DAMS
#1 & #2
DRAWN BY: G.A.D.
DATE: 4/16/81
SHEET 2 OF 2

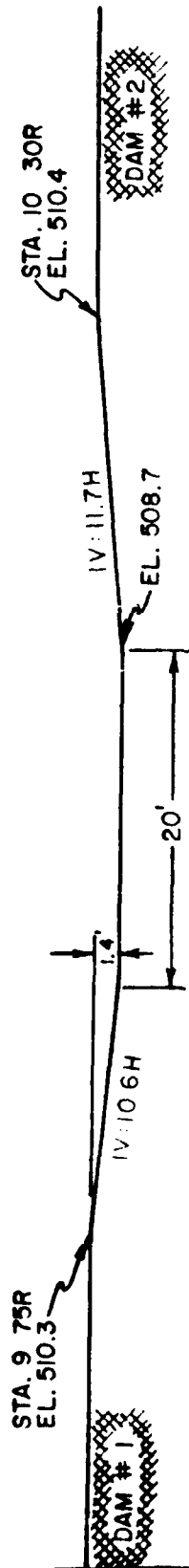


MAXIMUM SECTION (#2)
SCALE: 1" = 30'

WOODRUN DAMS
#1 & #2

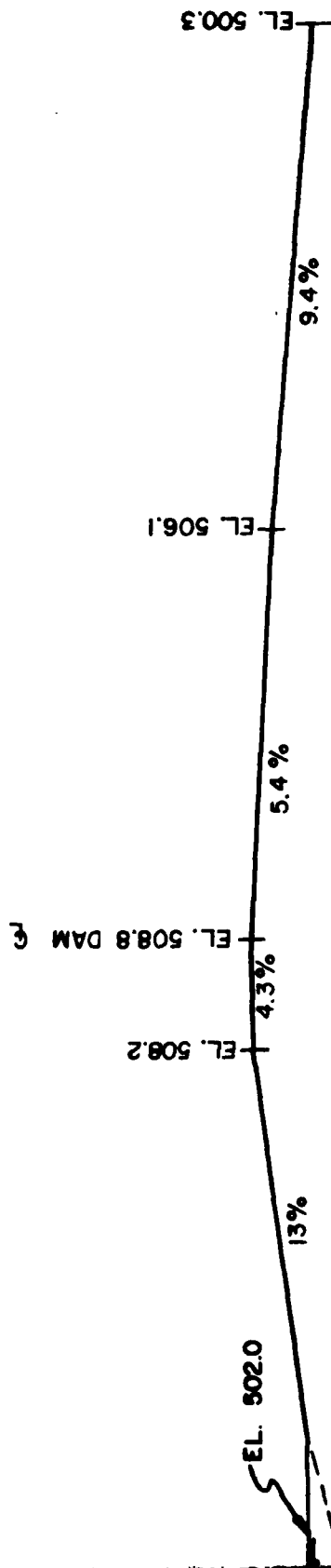
DRAWN BY GAD

DATE 4/16/89



EMERGENCY SPILLWAY CONTROL SECTION
SCALE: 1" = 10'

WOODRUN DAMS #1 & #2	DRAWN BY: G.A.D. DATE: 5/6/81 SHEET: 4 OF 6
-------------------------	---



EMERGENCY SPILLWAY PROFILE
SCALE: 1" = 20'

WOODRUN DAMS
#1 & #2

DRAWN BY: G.A.D.

DATE 5/7/81

SHEET 5 OF 6

WOODRUN DAMS

1 & #2

DRAWN BY: G.A.D

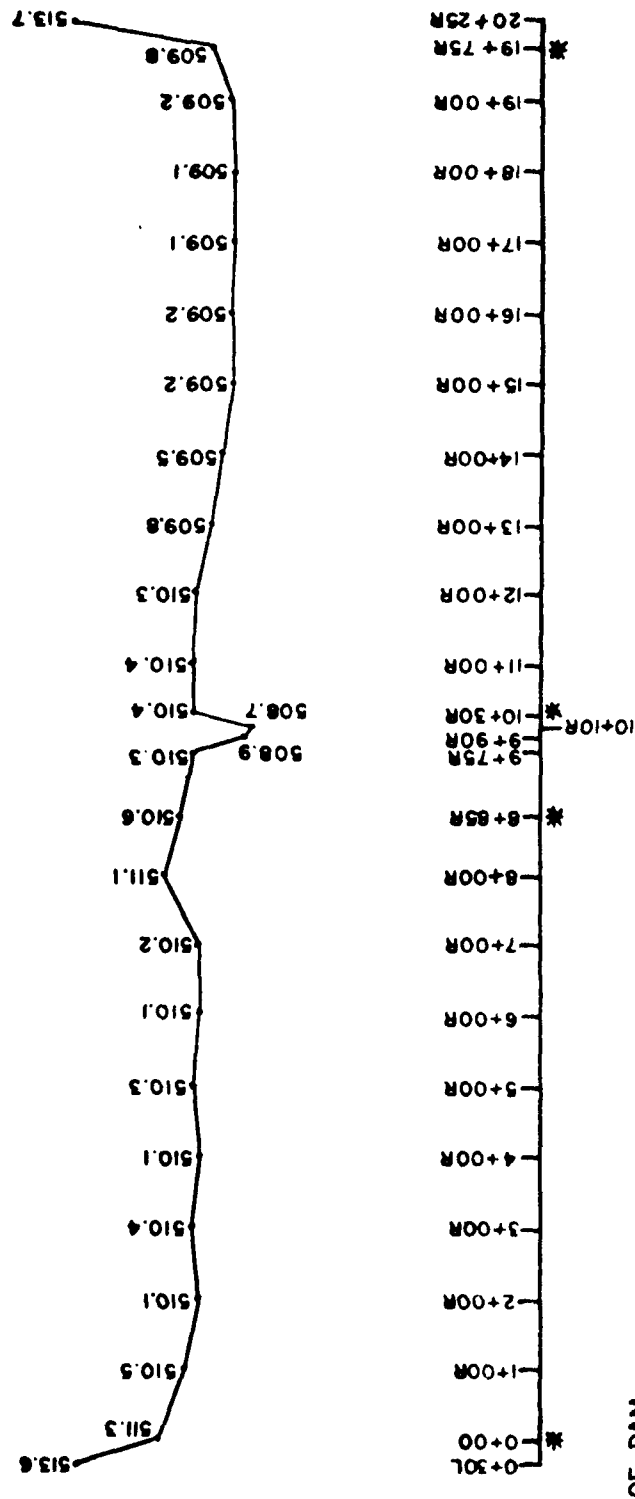
DATE: 4/16/81

SHEET 6 OF 6

CREST & PROFILE

H SCALE: " = 250'

V. SCALE: " = 5'



OF DAM

APPENDIX C
PHOTOGRAPHIC RECORD

PHOTOGRAPHIC RECORD

- Photo No. 1 - Crest of Dam #1 from left abutment.
- Photo No. 2 - Crest of Dam #2 from left end.
- Photo No. 3 - Lake from crest of Dam #1.
- Photo No. 4 - Lake from crest of Dam #2.
- Photo No. 5 - View of upstream slope of Dam #2.
- Photo No. 6 - Upstream slope of Dam #2 showing erosion from wave action.
- Photo No. 7 - Upstream slope of Dam #1 showing sloughing.
- Photo No. 8 - Downstream slope of Dam #1 showing eroded wet area and seepage trench.
- Photo No. 9 - Seepage trench at toe of Dam #1 in area of flow.
- Photo No. 10 - Downstream slope of Dam #1 showing erosion in wet area.
- Photo No. 11 - View downstream of Dam #1
- Photo Nos. 12 & 13 - Area downstream of Dam #1 showing lot of property owner who excavated trench.
- Photo No. 14 - Emergency spillway critical section.
- Photo No. 15 - Emergency spillway looking downstream from Dam #1.
- Photo Nos. 16, 17 & 18 - Emergency spillway exit channel.
- Photo No. 19 - Eroded trench at end of emergency spillway exit channel.
- Photo No. 20 - Eroded wet area on downstream slope of Dam #2.
- Photo No. 21 - Downstream right end of Dam #2 showing wet area and erosion.
- Photo No. 22 - Principal spillway outlet channel.
- Photo No. 23 - Principal spillway impact basin.

Photo No. 24 - Looking downstream from left end of Dam #1.

Photo No. 25 - Downstream area from right side of Dam #2.
Notice eroded channel along toe in foreground.

Photo Nos. 26, 27, 28 & 29 - Aerial shots.

Photographs taken during pre-inspection reconnaissance,
February 18, 1981: 1, 2, 3, 11, 16, 17, 25

Aerial shots were taken March 23, 1981.

Remaining photographs were taken during inspection,
March 10, 1981.



PHOTO NO.1



PHOTO NO.2

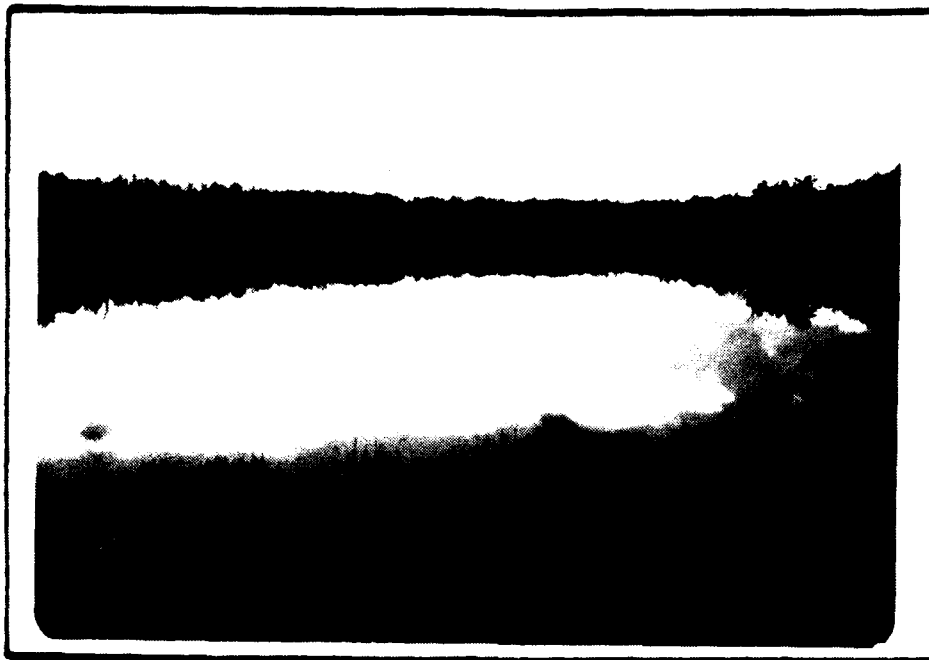


PHOTO NO. 3



PHOTO NO. 4



PHOTO NO.5



PHOTO NO.6



PHOTO NO. 7



PHOTO NO. 8



PHOTO NO. 9



PHOTO NO. 10



PHOTO NO. 11

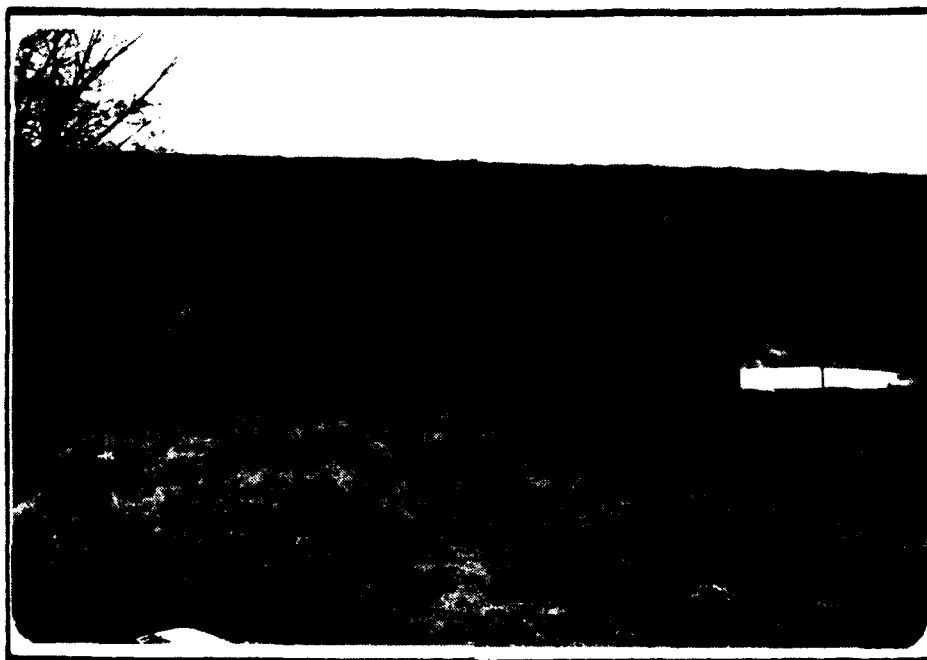


PHOTO NO. 12

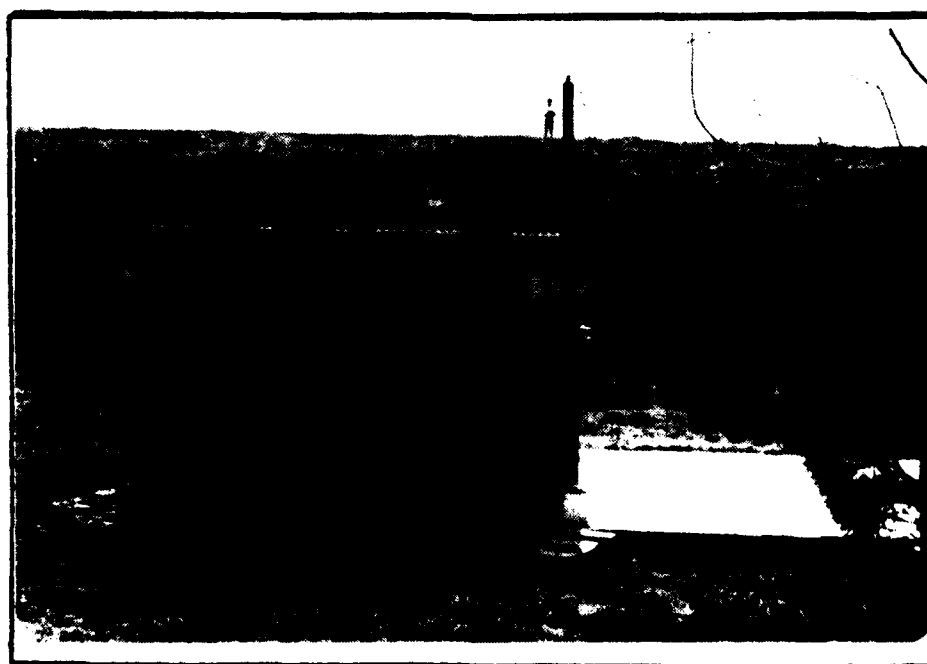


PHOTO NO. 13



PHOTO NO. 14



PHOTO NO. 15



PHOTO NO. 16



PHOTO NO. 17



PHOTO NO.18

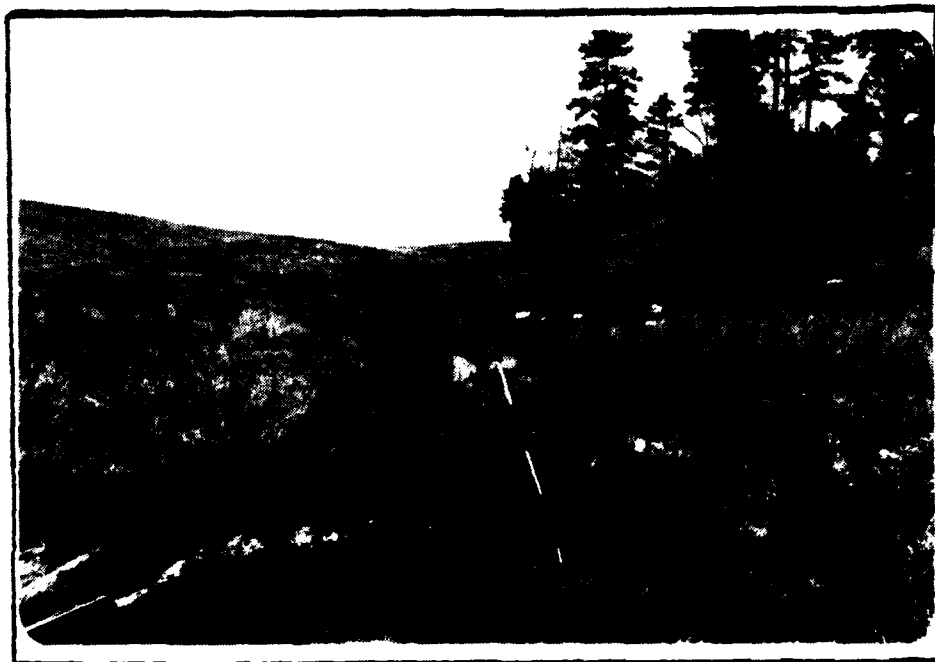


PHOTO NO.19



PHOTO NO.20



PHOTO NO.21



PHOTO NO. 22



PHOTO NO. 23



PHOTO NO. 24



PHOTO NO. 25

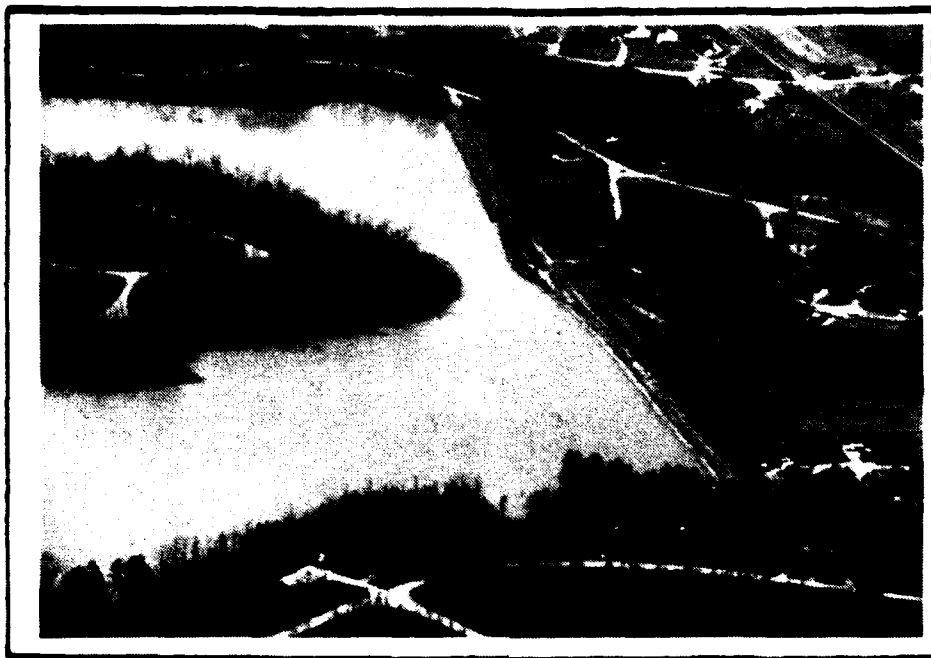


PHOTO NO. 26



PHOTO NO. 27



PHOTO NO. 28



PHOTO NO. 29

APPENDIX D
TECHNICAL CRITIQUE -
CHECKLISTS FOR VISUAL INSPECTION,
ENGINEERING DATA, SOIL TESTS

Check List
Visual Inspection of Earth Dams
Department of Conservation
Division of Water Resources

Name of Dam Woodrun # 1

County Hardeman Date of Inspection 3/10/81

ID # - State 35-7029 Federal TN 06933

Type of Dam Earth

Hazard Category-Federal High State 1

Weather Sunny, breezy Temperature 58°

Pool at Time of Inspection 8' (NP) (distance from crest)

Tailwater at Time of Inspection N/A (distance from stream bed)

Design/As Built Drawings Available: Yes X No

Location: TDWR - Nashville

Copy Obtained: Yes X No

Reviewed: Yes X No

Construction History Available: Yes No X

Location:

Copy Obtained: Yes No

Reviewed: Yes No

Other Records and Reports Available: Yes X No

Location: TDWR - Engineering report & specifications, and correspondence

Copy Obtained: Yes X No

Reviewed: Yes X No

Prior Incidents or Failures: Yes No X

Inspection Personnel and Affiliation:

Ed O'Neill - TDWR

George Moore - TDWR

Bill Culbert - TDWR

I. Embankment

A. Crest

Description (1st inspection) Reasonably flat and
uniform with intermittent bare areas.

1. Longitudinal Alignment Straight.

2. Longitudinal Surface Cracks None observed.

3. Transverse Surface Cracks None observed.

4. General Condition of Surface Good

5. Miscellaneous _____

B. Upstream Slope

1. Undesirable Growth or Debris Some tall weeds.
Could make for difficult access.

2. Sloughing, Subsidence, or Depressions Minor sloughing.

Mostly in area between dams.

3. Slope Protection Significant sloughing, as much as
2' vertical in some areas. Needs riprap. Remainder
of slope has good fescue cover.

a. Condition of Riprap N/A

b. Durability of Individual Stones N/A

c. Adequacy of Slope Protection Against Waves
and Runoff Fair to poor.

d. Gradation of Slope Protection - Localized Areas
of Fine Material N/A

4. Surface Cracks None

C. Downstream Slope

1. Undesirable Growth or Debris None

2. Sloughing, Subsidence, or Depressions; Abnormal
Bulges or Non-Uniformity Nothing significant.
3. Surface Cracks on Face of Slope None
4. Surface Cracks or Evidence of Heaving at
Embankment Toe None
5. Wet or Saturated Areas or Other Evidence of Seepage
on Face of Slope; Evidence of "Piping" or "Boils"
Wet area beginning approximately 25' up slope from
toe runs most of dam length.
6. Drainage System None found.
7. Fill Contact with Outlet Structure Good
8. Condition of Grass Slope Protection Fair. Significant
amount of erosion from surface runoff. Most of
cover is lost from wet area. Slope could use
regrassing.

D. Abutments

1. Erosion of Contact of Embankment with Abutment from
Surface Water Runoff, Upstream or Downstream _____

Nothing significant

2. Springs or Indications of Seepage Along Contact of
Embankment with the Abutments _____

None

3. Springs or Indications of Seepage in Areas a Short
Distance Downstream of Embankment - Abutment Tie-in

None

II. Area Downstream of Embankment, Including Channel

A. Localized Subsidence, Depressions, Sinkholes, Etc. _____

Nothing significant.

B. Evidence of "Piping", "Boils", or "Seepage" _____

A narrow trench has been dug around a lot at the toe of dam # 1. It contains pooled seepage along most of its length. A small clear flow of approximately 1/2 gpm could be observed near the wall of the section running parallel to the toe. The lot is owned by M. E. Adams of Memphis.

C. Unusual Presence of Lush Growth, such as Swamp

Grass, etc. Some at toe by seepage trench.

D. Unusual Muddy Water in Downstream Channel _____

N/A

E. Sloughing or Erosion _____

Nothing significant.

F. Surface Cracks or Evidence of Heaving Beyond

Embankment Toe None

G. Stability of Channel Sideslopes _____

N/A

H. Condition of Channel Slope Protection _____

N/A

I. Adequacy of Slope Protection Against Waves, Currents,
and Surface Runoff Would probably be damaged by
heavy flows.

J. Miscellaneous _____

K. Condition of Relief Wells, Drains, and Other
Appurtenances N/A

L. Unusual Increase or Decrease in Discharge from
Relief Wells N/A

III. Instrumentation

A. Monumentation/Surveys N/A

B. Observation Wells N/A

C. Weirs N/A

D. Piezometers N/A

E. Other _____

IV. Spillways

- A. Service Spillway (Service/Emergency Combination Yes No X) located ^{Principal spillway} in dam # 2

1. Intake Structure Condition N/A

2. Outlet Structure Condition N/A

3. Pipe Condition N/A

4. Evidence of Leakage or Piping N/A

5. General Remarks _____

B. Emergency Spillway

1. General Condition Good, but some significant erosion
at lower exit channel.

2. Entrance Channel Clear, uniform, minor erosion.

3. Control Section Same, better grass cover.

3. Exit Channel Same, better grass cover at upper end.
Significant erosion at lower end.

4. Vegetative/Woody Cover Grass only, fescue.

5. Other Observations Exit channel grass cover needs
improvement at lower end.

V. Emergency Drawdown Facilities (if part of service spillway
so state) Manually operated drawdown valve stem at riser
in lake # 2.

Are Facilities Operable: Yes _____ No _____ Probably _____

Were Facilities Operated During Inspection: Yes _____ No X

Date Facilities Were Last Used Unknown

VI. Reservoir

A. Slopes 10-15%. Considerable erosion on upstream slope of
connecting channel.

B. Sedimentation Appears moderate.

C. Turbidity Moderate, approximately 10" visibility.

VII. Drainage Area

Description (for hydrologic analysis) _____

Mostly wooded. Some residential and meadow.

A. Changes in Land Use None. Designed for residential.

VIII. Downstream Area (Stream)

A. Condition (obstructions, debris, etc.) _____

No significant obstructions.

B. Slopes Virtually flat.

C. Approximate No. Homes, Population, and Distance D/S

Maximum of 2 dozen camping trailers immediately down-
stream. Rogers Springs community downstream. 7 houses
and 2 stores affected.

D. Other Hazards Southern Railway main line to Memphis.

IX. Miscellaneous

Incidents/Failures None

Observed Geology of Area _____

X. Conclusions

1) The dam exhibits some significant wet areas with some seepage flow.

2) Areas of moderate erosion exist along the upstream and downstream slope of the dam.

XI. Recommendations

1) Riprap upstream slope at watershed to lessen effects of wave action.

2) Study all wet areas and seepage flow in trench that parallels downstream toe.

3) Regrass the downstream slope, especially in wet areas.

Regional Engineer

Chief Engineer

Check List
Visual Inspection of Earth Dams
Department of Conservation
Division of Water Resources

Name of Dam Woodrun # 2

County Hardeman Date of Inspection March 10, 1981

ID # - State 35-7033 Federal TN 06927

Type of Dam Earth

Hazard Category-Federal High State 1

Weather Sunny, breezy Temperature 58°

Pool at Time of Inspection 7' (NP) (distance from crest)

Tailwater at Time of Inspection 3/10' in pipe (distance from stream bed)

Design/As Built Drawings Available: Yes X No

Location: TDWR - Nashville office

Copy Obtained: Yes X No

Reviewed: Yes X No

Construction History Available: Yes X No Partial

Location: TDWR

Copy Obtained: Yes X No

Reviewed: Yes X No

Other Records and Reports Available: Yes X No

Location: TDWR - Engineering report and specifications, and correspondence

Copy Obtained: Yes X No

Reviewed: Yes X No

Prior Incidents or Failures: Yes No X

Inspection Personnel and Affiliation:

Ed O'Neill - TDWR

George Moore - TDWR

Bill Culbert - TDWR

I. Embankment

A. Crest

Description (1st inspection) Reasonably flat and
uniform. Grass cover with intermitant bare areas.

1. Longitudinal Alignment Straight

2. Longitudinal Surface Cracks None observed

3. Transverse Surface Cracks None observed.

4. General Condition of Surface Good

5. Miscellaneous _____

B. Upstream Slope

1. Undesirable Growth or Debris Some tall weeds. Could
make for difficult access.

2. Sloughing, Subsidence, or Depressions Minor sloughing,
mostly in area between dams.

3. Slope Protection Approximately 4' of riprap along
entire length of dam. Good fescue cover.

a. Condition of Riprap Fair. Approximately 30 lb.
average size. High in siltstone.

b. Durability of Individual Stones Fair to poor.

c. Adequacy of Slope Protection Against Waves
and Runoff Adequate.

d. Gradation of Slope Protection - Localized Areas
of Fine Material Several areas high in fines.

4. Surface Cracks None

C. Downstream Slope

1. Undesirable Growth or Debris Several pine seedlings

2. Sloughing, Subsidence, or Depressions; Abnormal
Bulges or Non-Uniformity Nothing significant.
3. Surface Cracks on Face of Slope None
4. Surface Cracks or Evidence of Heaving at
Embankment Toe None
5. Wet or Saturated Areas or Other Evidence of Seepage
on Face of Slope; Evidence of "Piping" or "Boils"
Wet area beginning approximately 25' up slope from
toe runs most of dam length.
6. Drainage System None found.
7. Fill Contact with Outlet Structure Good
8. Condition of Grass Slope Protection Fair. Significant
amount of erosion from surface runoff. Most of
cover is lost from wet area. Slope could use
regrassing.

D. Abutments

1. Erosion of Contact of Embankment with Abutment from
Surface Water Runoff, Upstream or Downstream _____

Nothing significant

2. Springs or Indications of Seepage Along Contact of
Embankment with the Abutments _____

None

3. Springs or Indications of Seepage in Areas a Short
Distance Downstream of Embankment - Abutment Tie-in

None

II. Area Downstream of Embankment, Including Channel

A. Localized Subsidence, Depressions, Sinkholes, Etc. _____

Nothing significant.

B. Evidence of "Piping", "Boils", or "Seepage" _____

Nothing significant.

**C. Unusual Presence of Lush Growth, such as Swamp
Grass, etc.** None

D. Unusual Muddy Water in Downstream Channel No

E. Sloughing or Erosion Nothing significant.

**F. Surface Cracks or Evidence of Heaving Beyond
Embankment Toe** None

G. Stability of Channel Sideslopes Adequate. Some noteworthy
erosion immediately downstream of impact basin. Natural
cover further downstream.

H. Condition of Channel Slope Protection Some noteworthy
erosion of bare channel immediately downstream of
impact basin, but it is of little consequence. Natural
cover further downstream. Little erosion here.

- I. Adequacy of Slope Protection Against Waves, Currents,
and Surface Runoff N/A

- J. Miscellaneous N/A

- K. Condition of Relief Wells, Drains, and Other
Appurtenances N/A

- L. Unusual Increase or Decrease in Discharge from
Relief Wells _____

III. Instrumentation

- A. Monumentation/Surveys N/A

- B. Observation Wells N/A

- C. Weirs N/A

- D. Piezometers N/A

- E. Other _____

IV. Spillways

A. Service Spillway (Service/Emergency Combination Yes ___ No ___)

1. Intake Structure Condition Good (observed from dam)

2. Outlet Structure Condition Good. No cracking or
spalling.

3. Pipe Condition Outlet appears in good condition.

4. Evidence of Leakage or Piping None

5. General Remarks _____

B. Emergency Spillway

1. General Condition Good, but some significant erosion
at lower end.

2. Entrance Channel Clear, uniform, minor erosion.

3. Control Section Same, better grass cover.

3. Exit Channel Same, but grass cover at upper end.

Significant erosion near toe.

4. Vegetative/Woody Cover Grass only. Fescue.

5. Other Observations Exit channel grass cover needs
improvement at lower end.

V. Emergency Drawdown Facilities (if part of service spillway
so state) Manually operated valve stem at riser.

Are Facilities Operable: Yes ☐ No ☐ Probably

Were Facilities Operated During Inspection: Yes ☐ No ☒

Date Facilities Were Last Used Unknown

VI. Reservoir

A. Slopes 10-15%. Considerable erosion on upstream
slopes of connecting channel.

B. Sedimentation Appears moderate.

C. Turbidity Moderate. Approximately 10" visibility.

VII. Drainage Area

Description (for hydrologic analysis) _____
Mostly wooded. Some residential and meadow.

A. Changes in Land Use None. Designed for residential.

VIII. Downstream Area (Stream)

A. Condition (obstructions, debris, etc.) _____

_____ No obstructions. _____

B. Slopes _____ Virtually flat. _____

C. Approximate No. Homes, Population, and Distance D/S

_____ Maximum of 2 dozen camping trailers immediately

_____ downstream. Rogers Springs Community 1500' - 2000'

_____ downstream. 7 houses and 2 stores in likely flood

_____ path. _____

D. Other Hazards _____ Southern Railway main line to Memphis. _____

IX. Miscellaneous

Incidents/Failures None

Observed Geology of Area _____

X. Conclusions

- 1) A significant wet area appears on the downstream slope of the dam.
- 2) The downstream slope of the dam has experienced appreciable erosion.

XI. Recommendations

- 1) Regrass the downstream slope of the dam and grade and regrass the lower emergency spillway exit channel.
- 2) Engage the services of a qualified engineer to study the wet areas and make recommendations for monitoring/correction if needed.
- 3) Remove pine seedlings from downstream slope.

William F. Caldwell
Regional Engineer

Chief Engineer

PROJECT WOOD RILL NO. 1 HOLE 1 ELEV. TOP _____ SHEET 1 OF 1 SHEETS

[illegible]

OHIO RIVER DIVISION, NASHVILLE DISTRICT

SOIL TEST DATA SUMMARY

PROJECT WOOD RUN NO. 2 HOLE 1 ELEV. TOP _____ SHEET 1 OF 1 SHEETS

[illegible]

APPENDIX E
DESIGN DRAWINGS

WOODRUN SUBDIVISION LAKE

ROGERS SPRINGS

HARDEMAN COUNTY, TENNESSEE

MARCH, 1973

RANDOLPH E HOLT
DEVELOPER

SA SMITH AND ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
MEMPHIS, TENNESSEE

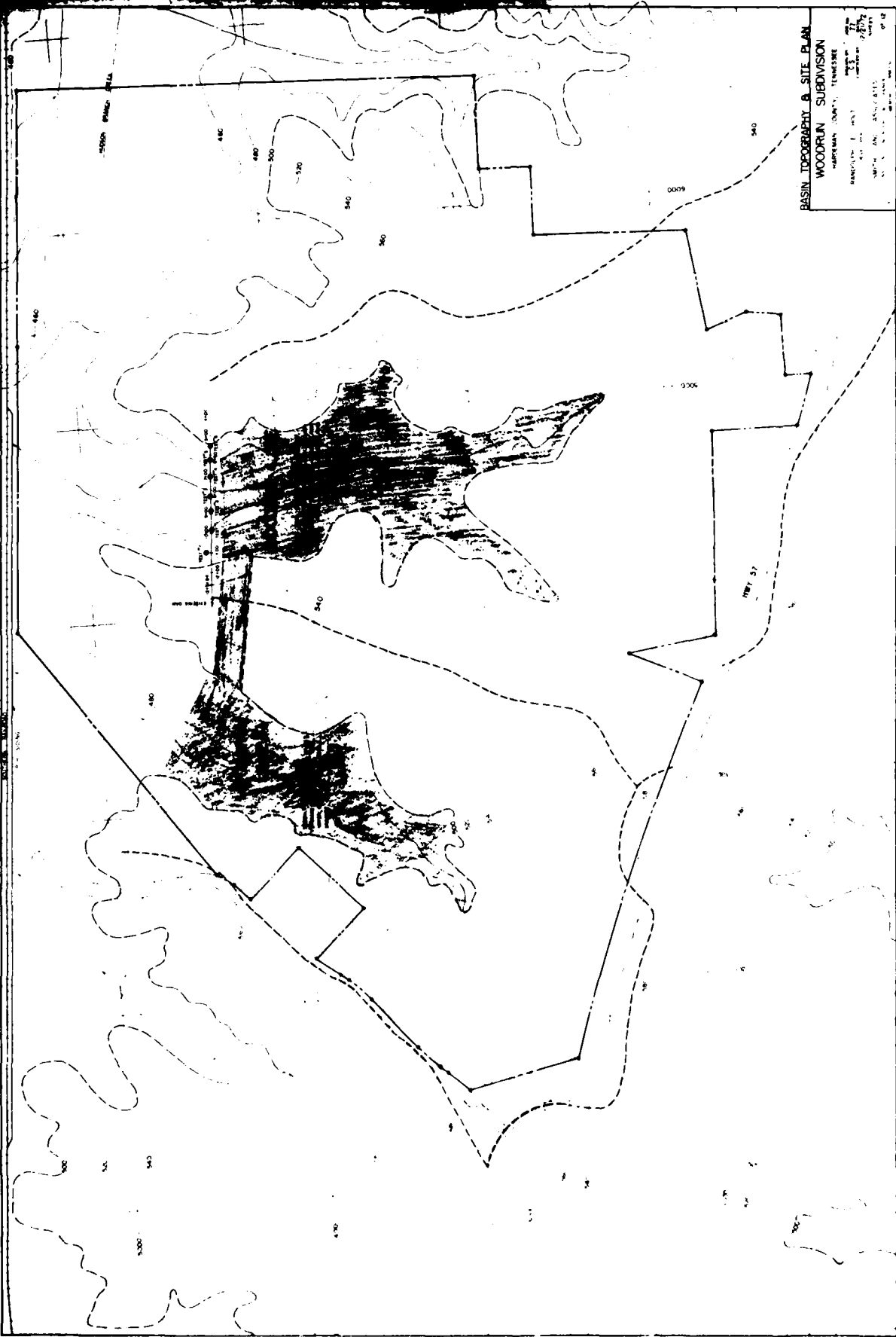
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2	DAM PLAN & PROFILE - DAM NO 1
3	DAM PLAN & PROFILE - DAM NO 2
4	SPILLWAYS - PLANS, SECTIONS, DETAILS
5	RETENTION BASIN GRADING PLAN
6, 7, 8, 9	CROSS SECTIONS
10, 11, 12	SUBDIVISION LAYOUT

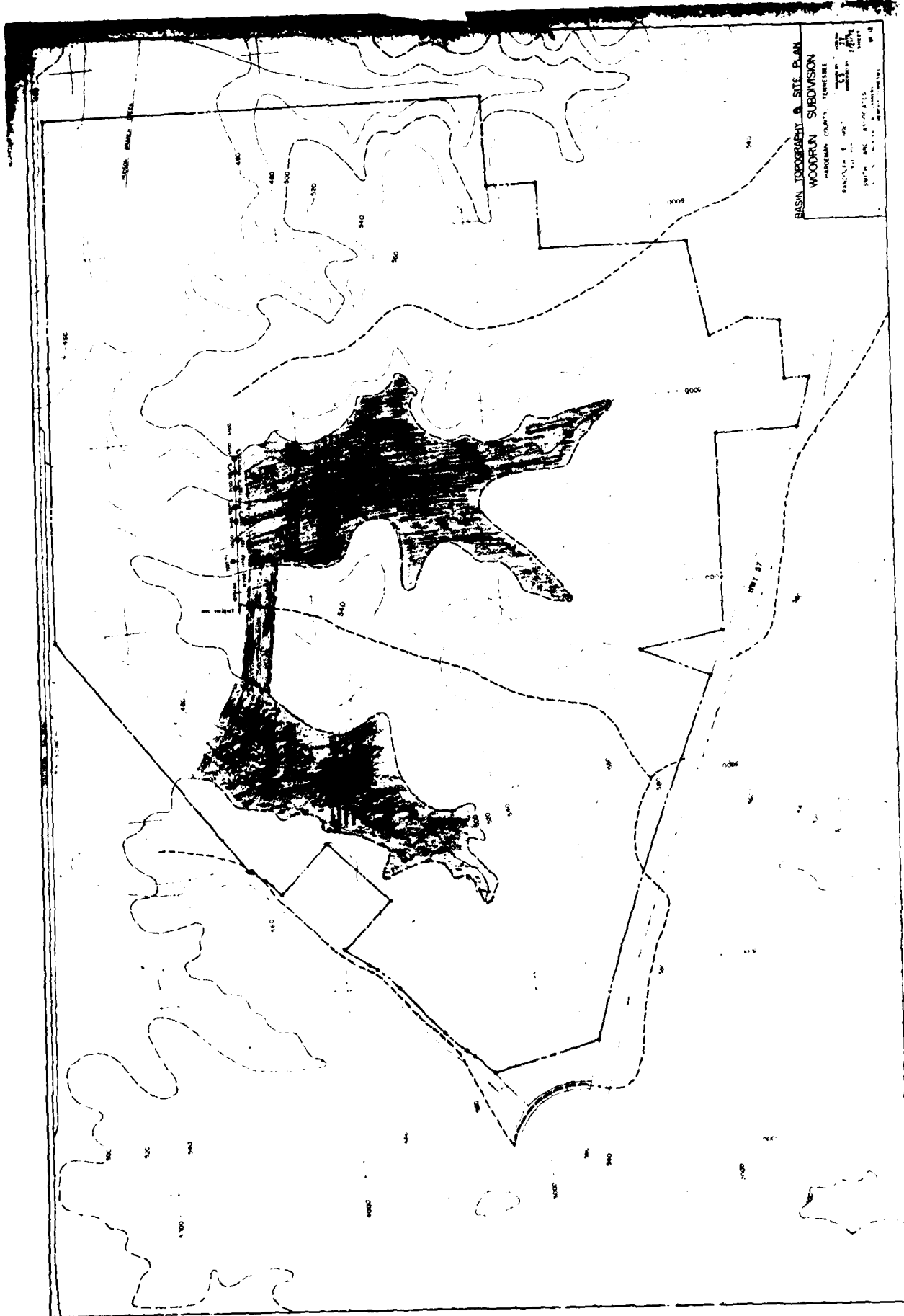
BASIN TOPOGRAPHY & SITE PLAN

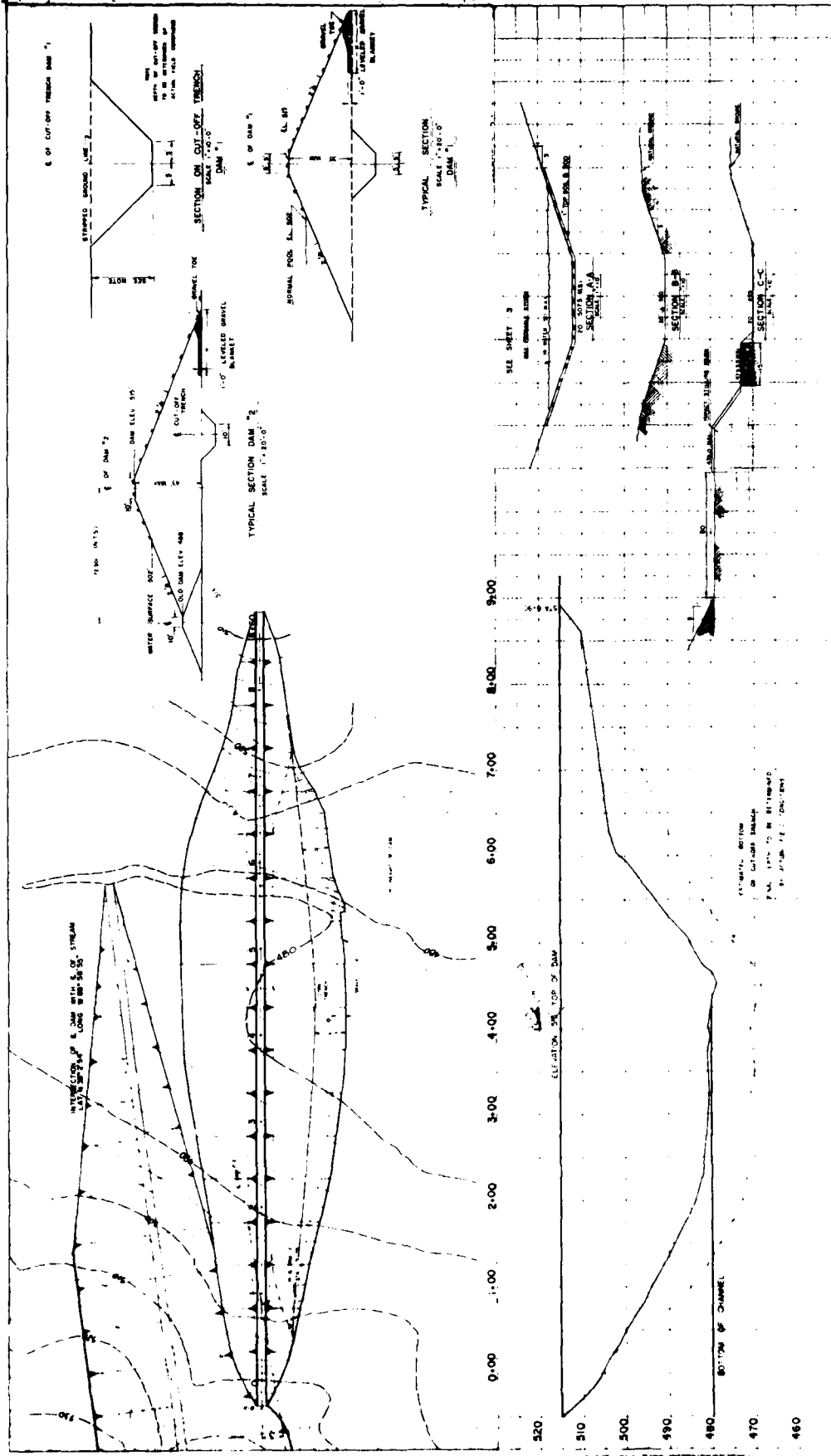
WOODRUM SUBDIVISION

HARRISMAN COUNTY, TENNESSEE

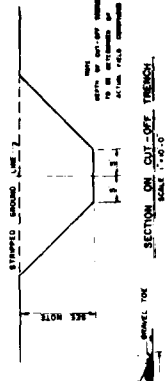
DATE: 1-1-57
BY: J. H. HARRISMAN
SCALE: 1" = 400'







E OF CUT-AND-FILL DAM #1



E OF DAM #1



TYPICAL SECTION
SCALE 1"=10'-0"

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00

ELEVATION OF TOP OF DAM

BOTTOM OF CHANNEL

SPILLWAY

ABUTMENT

ELEVATION OF DAM WITH 5' OF STREAM

SEE SHEET 3 FOR REMAINING DAM

SECTION A-A

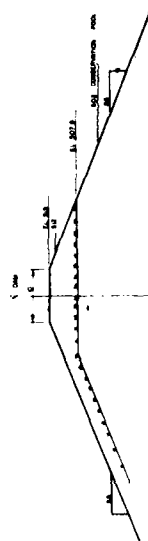
SECTION B-B

SECTION C-C

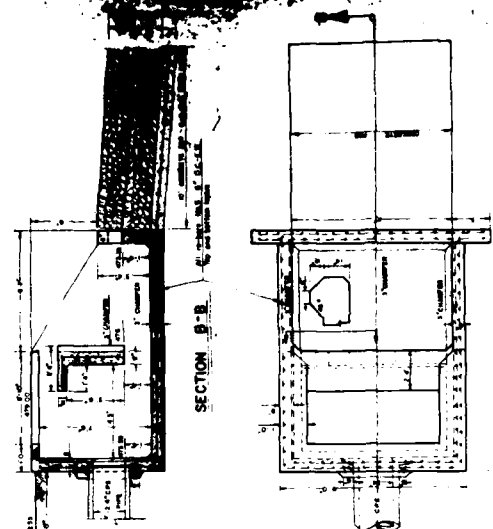
PROFILE SCALE:
1"=10'-0" HORIZ.
1"=50'-0" VERT.

DAM PLAN & PROFILE - DAM NO. 1
WOODRUM SUBDIVISION
HARRISMAN COUNTY, TENNESSEE

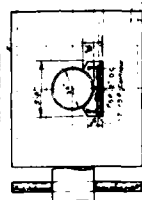
NO.	DATE	BY	CHKD.	APP'D.
1	10/1/51	J. H. WOODRUM	J. H. WOODRUM	J. H. WOODRUM
2	10/1/51	J. H. WOODRUM	J. H. WOODRUM	J. H. WOODRUM
3	10/1/51	J. H. WOODRUM	J. H. WOODRUM	J. H. WOODRUM
4	10/1/51	J. H. WOODRUM	J. H. WOODRUM	J. H. WOODRUM
5	10/1/51	J. H. WOODRUM	J. H. WOODRUM	J. H. WOODRUM

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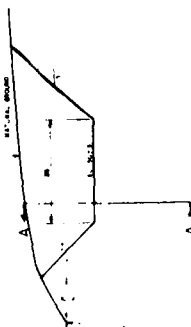
SECTION A-A



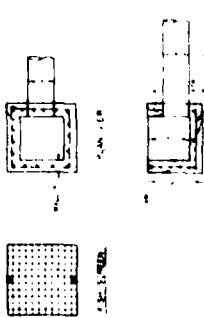
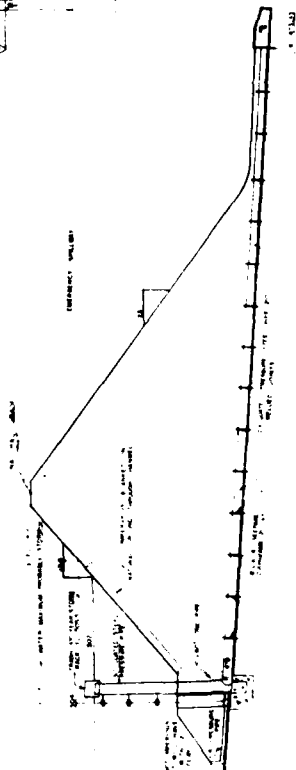
SECTION 8-B



DIAPHRAGM @ CRACKLE DETAIL



ELEVATION OF EMERGENCY
SPILLWAY



—E. J. BOYD, SECRETARY

PLAN OF SPILLWAY & DETAILS
W101011: SUBDIVISION

NAME	DATE	TIME	LOCATION	REMARKS
...

APPENDIX F
HYDRAULIC AND HYDROLOGIC DATA

HYDRAULIC AND HYDROLOGIC ANALYSIS

According to OCE guidelines, Woodrun Lake Dams 1 and 2 must be able to safely pass a minimum of the one-half Probable Maximum Flood ($\frac{1}{2}$ PMF). Six hour rainfall depths for the Probable Maximum Precipitation and the 100 year rainfall were obtained from the U. S. Weather Service's Technical Paper 40. Flood routings were performed using the HEC-1-DB computer program. The program uses the dimensionless hydrograph technique described in Section 4 of the Soil Conservation Service National Engineering Handbook and the modified Puls method of reservoir routing.

The peak outflow from the $\frac{1}{2}$ PMF (AMC II) is 110 cfs. The combined capacity of the principal and emergency spillways is 147 cfs.

SUMMARY OF ROUTINGS

EVENT	ANTECEDENT MOISTURE CONDITION	
	II	III
PMF	Overtops by 0.7 feet for 3.60 hours	Overtops by 0.7 feet for 3.80 hours
$\frac{1}{4}$ PMF	Passed Maintains 1.9 feet of freeboard	Passed Maintains 1.6 feet of freeboard
100 - YEAR	Passed Maintains 5.7 feet of freeboard	Passed Maintains 5.2 feet of freeboard

WOODRUN LK. DAMS #1 + 2

CURVE # + LAG TIME DETERMINATION

SOIL TYPE	HYDROLOGIC SOIL GROUP	% D.A.
LEXINGTON	B	85
FALAYA	C	7.5
WAVERLY	D	7.5

LAND USE :	CN		
	B	C	D
WATER - 17%			100
WOODLAND - 7%	60	73	79
MEADOW - 6%	58	71	78
(PROJECTED) LOW DENSITY RESIDENTIAL - 70%	76	83	86

$$\begin{aligned}
 CN &= 0.17 (100) + 0.07 [0.85 (60) + 0.075 (73) + 0.075 (79)] \\
 &\quad + 0.06 [0.85 (58) + 0.075 (71) + 0.075 (78)] \\
 &\quad + 0.70 [0.85 (76) + 0.075 (83) + 0.075 (86)] \\
 &= 17 + 4.4 + 3.6 + 5.4
 \end{aligned}$$

$$\begin{aligned}
 CN &= \frac{79}{4} \quad (AMC II) \\
 &\quad \frac{91}{4} \quad (AMC III)
 \end{aligned}$$

LAG TIME: USING SCS CURVE # METHOD

L = LONGEST WATER COURSE IN DRAINAGE AREA (ft)

Y = AVER. GROUND SLOPE OF D.A. (ft/ft)

$$S = \frac{1000}{CN} - 10$$

$$DAM \#1: L = \frac{1^{0.8} (S+1)^{0.7}}{1900 Y^{0.5}}$$

$$L = \frac{1000^{0.8} (2.66+1)^{0.7}}{1900 (14)^{0.5}}$$

$$\begin{aligned}
 LAG &= 0.088 \text{ hrs. (AMC II)} \\
 &= 0.057 \text{ hrs. (AMC III)}
 \end{aligned}$$

$$DAM \#2: L = \frac{1^{0.8} (S+1)^{0.7}}{1900 Y^{0.5}}$$

$$L = \frac{2200^{0.8} (2.66+1)^{0.7}}{1900 (14)^{0.5}}$$

$$\begin{aligned}
 LAG &= 0.055 \text{ hrs. (AMC II)} \\
 &= 0.107 \text{ hrs. (AMC III)}
 \end{aligned}$$

SPILLWAY RATING CALCULATIONS:

WEIR FLOW

$$Q = 3.1 (L) H^{3/2}$$

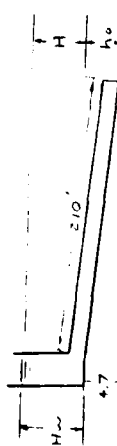
Hd	Q
1	24
2	69
3	126

INLET CONTROL PIPE FLOW

FROM NOMOGRAPH FOR SQ-EDGED ENTRANCE WITH 11 WING WALLS

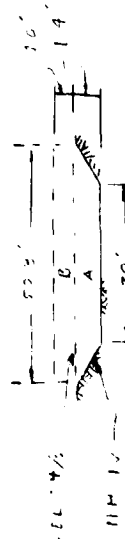
Hd BK. OF CONC. + CULVERT PIPE HYDR.

Hd	Hw	D	Q
1	0.4		
2	0.5	16	
3	1.2	27	
4	1.6	37	
5	2.0	45	
6	2.4	51	
9.5	3.8	70	
12	4.75	80	
13	5.25	85	



$$H_w + 4.7 = H + h_0$$

$$h_0 = D_c (\leq 5') + \frac{V^2}{2g}$$



OUTLET CONTROL PIPE FLOW

$$H = \left[\frac{2.5204 (1 + K_e)}{D^4} + \frac{466.18 n^2 L}{D^{16/3}} \left(\frac{Q}{10} \right)^2 \right]^{1/2}$$

$$K_e = 0.3, L = 210', n = 0.012$$

Hd BK. OF CONC. + CULVERT PIPE HYDR.

Q = Kc Dc^{5/2} FOR CIP CHANNELS (Kg's HD BK.)

Kc	Dc	Q	H	h0	Hw
6.23	2.3	50	4.9	4.2	4.4
		74	11	6.0	12
		80	13	6.6	14.4
		85	14.3	7.2	16.4
9.05	2.5	89	16	7.6	18.9
PIPE IS FULL @ OUTLET					
		100	20	8.9	24.2
		110	23	10.3	28.6
		120	29.4	11.8	34.5
		130	32	12.4	40.7

EL.	Hm	Q
509.1	0.3	11
510.2	1.4	157
511.2	2.4	517
512.2	3.4	1007

NONUNIFORM FLOW IN TRAP. CHANNELS (Kg's HD BK.)

EMER. SPIL. FLOW

$$Q = c B H_m^{3/2}$$

$$\frac{H_m(\frac{3}{2})}{B} = \frac{H_m(11)}{20} \rightarrow c$$

RECT CHANNEL FLOW

$$Q = 2.4 H_d^{3/2} = 2.4 + 6.8$$

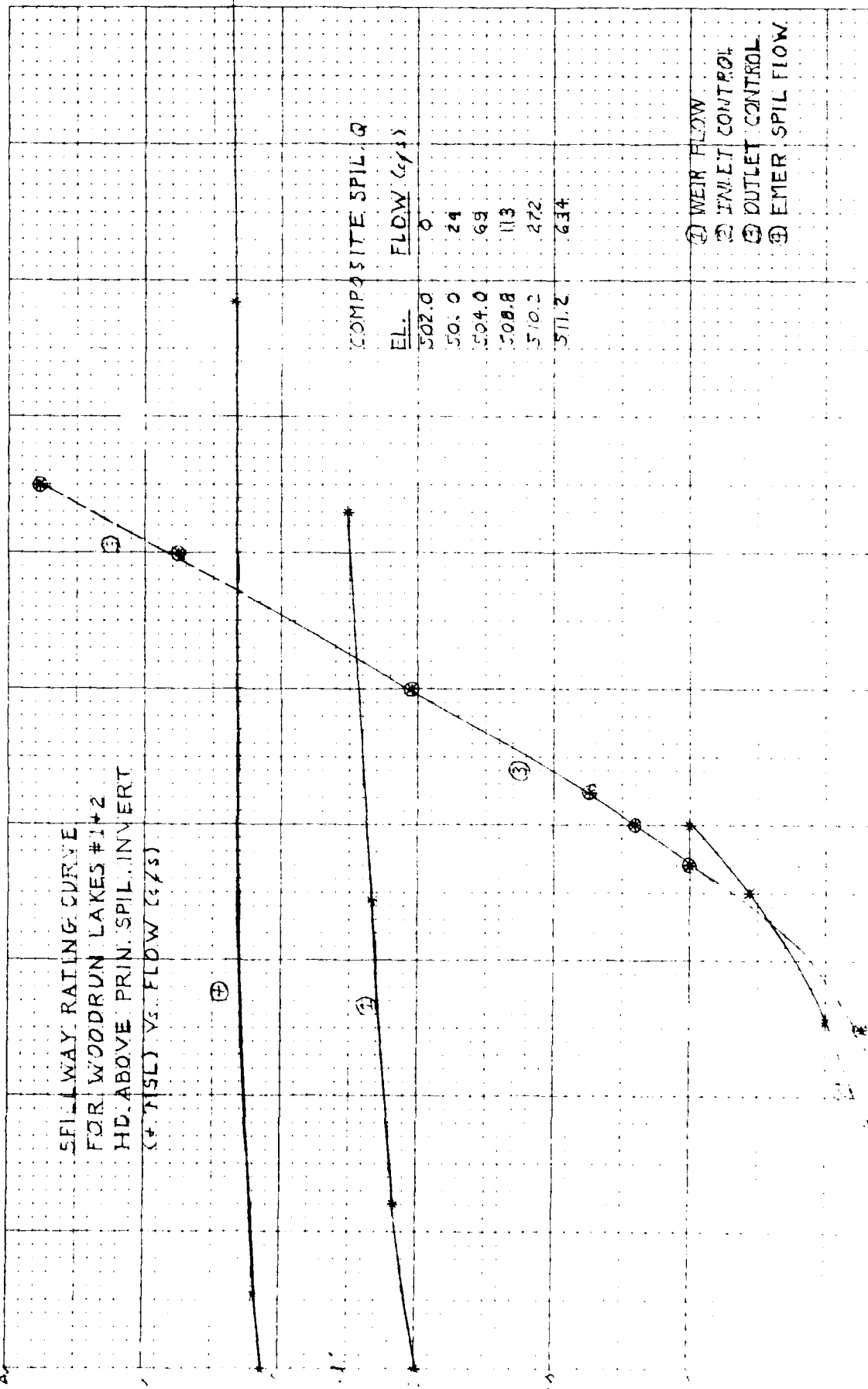
$$= 157 + c B H_m^{3/2} + 4^{3/2} (AREA)$$

$$= 157 + 2.4 (50.8) + 4 (50.8)$$

$$= 157 + 157 + 203$$

$$= 517 \text{ cfs}$$

SPILLWAY RATING CURVE
FOR WOODRUM LAKES #1 & 2
HD. ABOVE PRIN. SPIL. INVERT
(+ 75L) VS. FLOW (CFS)



AD-A108 256

TENNESSEE STATE DEPT OF CONSERVATION NASHVILLE DIV 0--ETC F/G 13/13
NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE. --ETC(U)
SEP 81 W CULBERT DACW62-81-C-0056

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2 OF 2

AD A
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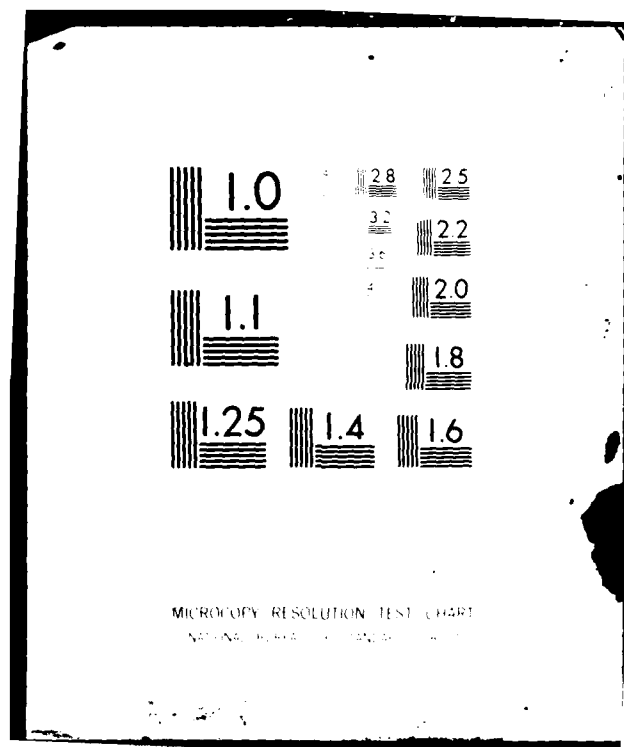
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01-82

DTIC



 FLOOD HYDROGRAPH PACKAGE (MFC-1)
 DAP SAFETY VERSION JULY 1974
 LAST MODIFICATION 21 APR 80

LINE	PARAMETER	VALUE	UNIT	DESCRIPTION
1	AL	1		WOLFFER DAM S 1-2
2	A2	1		WOLFFER DAM S 1-2
3	A3	1		WOLFFER DAM S 1-2
4	A4	1		WOLFFER DAM S 1-2
5	A5	1		WOLFFER DAM S 1-2
6	A6	1		WOLFFER DAM S 1-2
7	A7	1		WOLFFER DAM S 1-2
8	A8	1		WOLFFER DAM S 1-2
9	A9	1		WOLFFER DAM S 1-2
10	A10	1		WOLFFER DAM S 1-2
11	A11	1		WOLFFER DAM S 1-2
12	A12	1		WOLFFER DAM S 1-2
13	A13	1		WOLFFER DAM S 1-2
14	A14	1		WOLFFER DAM S 1-2
15	A15	1		WOLFFER DAM S 1-2
16	A16	1		WOLFFER DAM S 1-2
17	A17	1		WOLFFER DAM S 1-2
18	A18	1		WOLFFER DAM S 1-2
19	A19	1		WOLFFER DAM S 1-2
20	A20	1		WOLFFER DAM S 1-2
21	A21	1		WOLFFER DAM S 1-2
22	A22	1		WOLFFER DAM S 1-2
23	A23	1		WOLFFER DAM S 1-2
24	A24	1		WOLFFER DAM S 1-2
25	A25	1		WOLFFER DAM S 1-2
26	A26	1		WOLFFER DAM S 1-2
27	A27	1		WOLFFER DAM S 1-2
28	A28	1		WOLFFER DAM S 1-2
29	A29	1		WOLFFER DAM S 1-2
30	A30	1		WOLFFER DAM S 1-2
31	A31	1		WOLFFER DAM S 1-2
32	A32	1		WOLFFER DAM S 1-2
33	A33	1		WOLFFER DAM S 1-2
34	A34	1		WOLFFER DAM S 1-2
35	A35	1		WOLFFER DAM S 1-2
36	A36	1		WOLFFER DAM S 1-2

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
400.	22.	22.	22.	5180.
11.	1.	1.	1.	147.
	3.24	3.24	3.24	3.28
	82.34	83.26	83.26	83.26
	42.	43.	43.	43.
	52.	53.	53.	53.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
31.	105.	124.	139.	151.
213.	237.	242.	246.	249.
309.	329.	331.	333.	336.
397.	700.	1606.	1434.	729.
372.	324.	326.	326.	326.
272.	210.	257.	257.	256.
62.	15.	3.	3.	3.
2.	2.	2.	2.	2.
2.	2.	2.	2.	2.
2.	2.	2.	2.	2.
2.	2.	2.	2.	2.
2.	2.	2.	2.	2.

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
1666.	22.	22.	22.	21533.
47.	1.	1.	1.	611.
	3.24	3.24	3.24	13.66
	82.34	83.26	83.26	346.90
	42.	43.	43.	175.
	52.	53.	53.	231.

HYDROGRAPH AT STA 2 FOR PLAN 1. RTIO 2

HYDROGRAPH AT STA 2 FOR PLAN 1. RTIO 2

[illegible]

[illegible]

[illegible]

HYL 97, KAFH KUTYINC.

ROUTING PARAMETERS

ISTAQ	ICOMP	T=CUN	ITAP	JPLT	JPPT	INAME	ISTAGE	IAUTO
3	1	3	0	0	0	1	0	0

0.0
5.5

INSTPS	NSTOL	LAG	APK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-502.	-1

\$TAC	'02.00	503.00	504.00	514.50	510.20	511.20
-------	--------	--------	--------	--------	--------	--------

[illegible]

Category	1951	1952	1953	1954	1955
Capital	100	100	100	100	100
Operating	100	100	100	100	100
Other	100	100	100	100	100

DATE	DESCRIPTION	AMOUNT	BALANCE
1911
1912
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2025
2026	...		

CFTL	SPWID	CNO#	ZXPM	ZLV	CJUL	CAREA	EXPL
02.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA	
CRQD	XPD
3.1	1.5

TGP: 1
 509.1

DAMWID 183C.

CONSTITUTION
AT 10:45 AM
ELEVATION

STATION 3, PLAN 1, RATIO 1

END-(F-P) HYDROGRAPH ORDINATES

OUTLINE

[illegible]

PEAK	8-410.2	24-410.2	72-410.2	TOTAL VOLUME
42.	42.	12.	12.	3000.
1.	1.	2.	3.	85.
	1.20	1.20	1.20	1.20
	21.37	30.37	30.37	30.37
	10.	25.	25.	25.
	22.	31.	31.	31.

CFS
 CWS
 1-CHS
 MM
 AC-FT
 1-CHS CUB

5. INPUT PAGE

[illegible][illegible]

STORAGE

[illegible]

[illegible]

END PAGE 11 17.10 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFS	981.	446.	121.	121.		29046.
CMS	28.	11.	3.	3.		22.
INCHES		9.71	11.54	11.58		11.58
MM		246.12	294.04	294.04		294.04
AC-FT		231.	246.	246.		240.
THOUS CU M		246.	246.	246.		296.

SUMMARY OF DAM SAFETY ANALYSIS

PLP :	INITIAL VALU		SPILLWAY CAPST		TOP OF DAM	
	FLEVATION	STORAGE	OUTFLOW	502.00	502.00	505.10
				501.	501.	914.
				0.	0.	147.
RATIO	MAXIMUM		MAXIMUM		DURATION	
	RESERVOIR	W.S. ELEV	DEPTH	STORAGE	OVER TOP	MAX OUTFLOW
CF			OVER DAM	AC-FT	HOURS	HOURS
0.01	503.40	507.22	0.00	404.	0.00	14.20
0.50	507.22	509.70	0.00	799.	0.00	16.30
1.00	509.70		.65	981.	3.63	17.10
						TIME OF
						FAILURE
						HOURS
						0.00
						0.00
						0.00

STABILITY OF DAMS BY ANALYSIS

PIE	ELEVATION STORAGE- OUTFLOW	INITIAL VOLUME CFS CU	ILL-AY DRAIN CFS CU	TOP OF DAM 505.10 914. 147.	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.12	MAXIMUM ELEVATION 503.40	MAXIMUM OUTFLOW 0.00	MAXIMUM OUTFLOW 0.00		MAXIMUM OUTFLOW 0.00	0.00	16.20	0.00
0.40	507.22	0.00	120.		120.	0.00	16.30	0.00
1.00	509.78	0.00	400.		400.	3.00	17.10	0.00

[illegible]

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION STORAGE OUTFLOW	INITIAL VALUE 502.00 551. 0.	SPILLWAY CREST 502.00 551. 0.	TOP OF DAM 502.10 518. 147.	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
RATIO OF PMF	MAXIMUM RESERVOIR U.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS			
.16	503.92	0.00	631.	65.	0.00	18.10	0.00
.50	507.49	0.00	815.	111.	0.00	18.20	0.00
1.00	509.81	.71	957.	1048.	3.80	16.40	0.00

FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 01 APR 80
 EOL.
 E)

APPENDIX G
CORRESPONDENCE

ROBERT B. SMITH, P.E.

MEMPHIS, TENNESSEE 38132
2603 Corporate Avenue,

Mr. Randolph Holt has not advised us or answered our letters or calls concerning the construction on Dam No. 2. Now that construction on Dam No. 2 has progressed so far and we have not made the proper inspections, we will be unable to certify that the construction on this project complies with approved plans and specifications.

Page 2

Tennessee Department of Conservation
January 20, 1975

The combination of the Developer apparently hiring another engineer to represent him plus the unusual break in the work has substantially increased our liability with out being under our control. We, therefore, request that you advise us that we are no longer named as the Engineer of Record and are here by relieved of all responsibility for the project.

Yours very truly,

SMITH & ASSOCIATES



Robert B. Smith

RBS/me

CERTIFIED

RECEIVED

JAN 28 1975

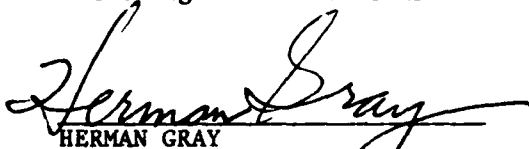
DEPT. OF CONSERVATION
WATER RESOURCES

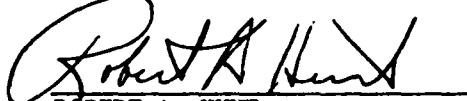
NON-FEDERAL DAM INSPECTION REVIEW BOARD
PO BOX 1070
NASHVILLE, TENNESSEE 37202

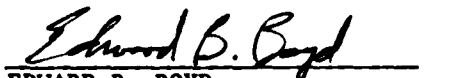
ORNED-G


Commander, Nashville District
US Army, Corps of Engineers
PO Box 1070
Nashville, TN 37202

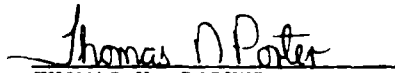
1. The Interagency Review Board, appointed by the Commander on 8 October 1980, presents the following recommendations after meeting on 18 June 1981 to consider the Phase I investigation reports on Woodrun Dams No. 1 and 2 inspected by the Tennessee Department of Conservation.
2. The condition classification for Woodrun Dam No. 1 should be changed from "significantly deficient" to "unsafe-nonemergency".
3. The correct soil classification in Section 3.1.1 should be clayey sand.
4. The board is in agreement with other report conclusions and recommendations following minor revisions.



HERMAN GRAY
Chief, Design Branch
Alternate Chairman


ROBERT A. HUNT
Direction, Division of Water
Resources
State of Tennessee


EDWARD B. BOYD
Hydrologic Technician
Alternate, US Geological Survey


BOBBY G. MOORE
Assistant State Conservation Engineer
Alternate, Soil Conservation Service


THOMAS N. PORTER
Hydraulic Engineer
Alternate, Hydrology and
Hydraulics Branch


TIMOTHY MCGLESKEY
Chief, Instrumentation and
Inspection Section
Alternate, Geological Branch



DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

25 JUN 1981

IN REPLY REFER TO

ORNED-G

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Please be informed of the results of an inspection, under authority of Public Law 92-367, conducted on Woodrun Dam No. 1 in Hardeman County, Tennessee. An inspection team, composed of personnel from your Division of Water Resources, observed conditions which indicate a high potential for failure of the embankment due to excessive seepage on the embankment and at the toe of the dam.

Woodrun Dam No. 1 is classified as a high hazard potential, small size dam, and as such, should be able to regulate a 1/2 probable maximum flood (1/2 PMF) to conform to inspection program guidelines. An analysis of the hydrology associated with the dam reveals that it can regulate an inflow in excess of the design flood.

However, in view of the presence of this excessive seepage of the embankment this dam is considered unsafe. While I do not view this as an emergency at this time, I recommend you initiate prompt action by the State to cause the owner to correct this serious deficiency to minimize the risk to the trailer park located immediately downstream from the dam.

A report of the technical investigation will be furnished your office upon completion.

Sincerely,

LEE W. TUCKER
Colonel, Corps of Engineers
Commander

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

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